IDENTIFYING FACTORS PREDICTING THE MATH COMPUTATION AND MATH REASONING PERFORMANCE LEVELS OF LATINO ELEMENTARY SCHOOL STUDENTS

by

Mark L. Guthmiller

A dissertation submitted to the faculty of
The University of Utah
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Department of Educational Psychology

The University of Utah

May 2010

THE UNIVERSITY OF UTAH GRADUATE SCHOOL

SUPERVISORY COMMITTEE APPROVAL

of a dissertation submitted by

Mark L. Guthmiller

This dissertation has been read by each member of the following supervisory committee and by majority vote has been found to be satisfactory.

2/22/10	Chair: John L. Hosp
2/22/10	Elaine Clark
2/22/10	Daniel E. Olympia
2/22/10	Janiece L. Pompa
2-22-10	Lora Tuesday-Heathfield

THE UNIVERSITY OF UTAH GRADUATE SCHOOL

FINAL READING APPROVAL

To the Graduate Council of the University of Utah:

I have read the dissertation of Mark L. Guthmiller in its final form and have found that (1) its format, citations, and bibliographic style are consistent and acceptable; (2) its illustrative materials including figures, tables, and charts are in place; and (3) the final manuscript is satisfactory to the supervisory committee and is ready for submission to The Graduate School.

2/22/10

Date

John L. Hosp
Chair, Supervisory Committee

Approved for the Major Department

Elaine Clark
Chair

Approved for the Graduate Council

Charles A. Wight
Dean of The Graduate School

ABSTRACT

A cohort of 87 Latino elementary school students participated in a study to identify factors predictive of the math reasoning and math computation performance levels. Multiple regression analyses were used to determine which of the five blocks or combination of blocks were significantly predictive of performance levels on two standardized academic achievement subtests. The predictor blocks included intellectual functioning, reading proficiency, language proficiency, acculturation, and behavior. Intellectual functioning was determined using a nonverbal assessment, and language proficiency was measured as a separate variable. The results show that one block was independently and incrementally predictive of performance on both dependent variables. Additional significant independent and incremental predictive variables were also identified. Implications for practice and future research are also discussed.

TABLE OF CONTENTS

Page

LIST OF TABLES

Table		Page

LIST OF FIGURES

ACKNOWLEDGMENTS

This dissertation marks the end of a very long and costly road that began decades ago. Along the way there have been any number of people who have stood behind me and provided me support. It is those individuals who I would like to offer my gratitude. To Benjamin, Amanda, Christian, and Laura, my children, who have had to live without their dad being there for important events and much of their daily lives: You are a blessing and I love each of you more than any words can begin to express. I am proud of my education, but I am most proud of you. You are my pride and joy. It is my foremost hope that you will all see the value of education and understand the perseverance, hard work, and dedication it takes to achieve a goal. Never give up. Never look back. Keep your eye on the prize.

For those who were unable to be with me in person, I know you were always there in spirit. I dedicate this dissertation to my father, who wanted to be a physician, to my mother, who always wanted to go to college, and to my brother, who always wanted simple peace. Know that what you taught me, the values you instilled, and the faith you gave me are what brought me to this place. I miss you all but love you and all that you stand for.

To my brother, John, who was my first real teacher, and a man I admire, you know what you have done to help me get here. You have done too much for so long, I cannot find a way to thank you. We are all that are left, but we stand strong

together.

To the love of my life, Susan, you are my best friend, the love of my life, the love of my lifetime. You mean everything to me. Having you in my life is a prayer answered. What we have is rare. Few people have what we have. I look forward to the future with joy, hope, and enthusiasm. The best is yet to come. I know our dreams will come true. Thank you for all that you have done. I love you with all my heart.

Without the help of my dissertation committee, I would not have been able to complete this. John Hosp, the committee chair, endured much, persevered through many long hours of explaining, and provided much needed advice. I can never thank him enough. He made this project much easier. It was his vision and patience that allowed me to do what I have done. It was a pleasure working with him, and it is an honor to call him my friend. Dan Olympia was my academic advisor; he connected me with many opportunities throughout the course of my career. I offer him my gratitude. The other members of my committee, Elaine Clark, Janiece Pompa, and Lora Tuesday-Heathfield, have all provided me with great suggestions and valuable advice during the writing of this document. Thank you all.

CHAPTER 1

INTRODUCTION AND REVIEW OF THE LITERATURE

The Latino people are a significant element of American cultural diversity. Due to decades of historically high levels of immigration and high birth rates, Latinos constitute the single largest ethnic minority group in the United States and are predicted to continue growing in both number and percentage of the overall U.S. population (Marotta & Garcia, 2003; U.S. Census Bureau, 2000a). The demographic characteristics of the general population are reflected in the U.S. public school system. Latino students also constitute the largest ethnic minority group in U.S. schools (Smith-Adcock, Daniels, Lee, Villalba, & Indelicato, 2006; U.S. Department of Education, National Center for Education Statistics, 2003). A comparison of the levels of academic performance, participation, and educational attainment of Latino students with others of nearly every racial identity reveals alarming disparities. Progress monitoring, levels of enrollment in advanced placement classes, and retention and graduation rates all emphasize how Latino students do not experience egalitarian educational outcomes. The impact of derisory Latino educational success reaches far beyond the school system. Lesser education attainment is strongly correlated with lower incomes, greater reliance on governmental assistance, and higher rates of incarceration. Contributing to the academic disparities encountered by Latino students are math performance deficiencies that typically develop in elementary school and generally worsen over time. To remediate the impact of these underdeveloped skills, policymakers need to implement educational programming and researchers need to identify factors predictive of math performance that will increase the likelihood of success for Latino students.

Demographic Data

Of the estimated 281 million people living in the United States in 2000, approximately 40% were identified as non-White (U.S. Census Bureau, 2000b). The largest ethnic minority group is comprised of individuals who self-identified as Latino. The Latino community constitutes approximately 12% of the overall population and approximately 30% of the ethnic minority population. The relative size of the Latino community is also similar in the public school system. According to the U.S. Department of Education, National Center for Education Statistics (2003), nearly 17% of the students enrolled in the public school system are identified as Latino. In 2000, more than 2 million Latino students were enrolled in high school (U.S. Census Bureau, 2003). Administrators and educators must incorporate the demographic characteristics of the Latino community when developing educational policies and making programming decisions.

Equally important as the size of the Latino community is the growth rate. In addition to being the single largest ethnic minority group, the Latino community is also the fastest growing segment of the U.S. population. Although the proportion of the overall population identified as White has decreased, the proportion of the population identified as Latino has increased (Lee & Edmonston, 2006). In 1950, 3%

of the U.S. population were identified as Latino. By 2000, Latinos constituted 13% of the overall U.S. population. In 1980, 14.6 million Latinos were living in the United States. Ten years later, in 1990, the Latino population had increased by 53% to 22.4 million. During that same time, the non-Hispanic White population showed an increase of only 7% (U.S. Census Bureau, 1990). Between 1990 and 2000, the Latino population in the United States increased from 22.4 million to 32.8 million. At the same time, the U.S. population increased from 249 million to 281 million (U.S. Census Bureau, 2000a). The 10.4 million more Latino people accounted for nearly one third of the overall population growth of 32 million in those 10 years. If the present growth rate of the Latino community continues, estimates suggest that by 2010 Latino people will represent 20% of the U.S. population (Marotta & Garcia, 2003). Other projections suggest that by 2030 the Latino people will constitute approximately 25% of the U.S. population (Lee & Edmonston).

The increase in the Latino population in the United States has been attributed to two factors (Lee & Edmonston, 2006). One source is immigration. Nearly one half of the immigrant population during the 1990s was Latino. Approximately 5.5 million Latino people immigrated to the United States between 1990 and 1999 (U.S. Census Bureau, 2000b). Given the proximity of Mexico and other Latin American countries to the United States, the increase is not surprising. Based on figures from the 1990 census, the largest portion of individuals self-identified as Latino reported Mexico (60%) as their country of origin, Puerto Rico with 12%, Cuba with 5%, and other countries with 23%. Marotta and Garcia (2003) reported different figures but noted the category “other” included individuals from both Central America and South America. They also highlighted that a twofold increase in that category reflected an influx of individuals from El Salvador and Colombia.

The other primary source of the increased Latino population is a comparatively high birth rate (Lee & Edmonston, 2006). Latino women have a higher birth rate than women from other ethnic groups (Afable-Munsuz & Brindis, 2006; Bacchus & O’Connell, 1998). According to the Lee and Edmonston study, the birth rate among Latino women is 84 births per 1,000 compared with 62 per 1,000 for African American women and 57 per 1,000 for White women. These factors contribute to a growing presence in the U.S. culture, including public schools, of a population identified as Latino.

The Latino population in Utah has also shown a significant increase since 1990 (State Office of Ethnic Affairs, 2004). The State Office of Ethnic Affairs reported the number of people living in Utah identified as Latino increased 138.3% between 1990 and 2004. This growth rate is more than twice that of the nation as a whole. In 1990, the Latino people constituted 4.9% of the state’s overall population. By 2000, the percentage had grown to 9.0%. In 2004, 10.6% of the residents in Utah were identified as Latino.

Public School Demographics

The rapid growth of the Latino population has been echoed in the demographics of U.S. schools. Latino students constitute the single largest ethnic minority in the public school system (Smith-Adcock et al., 2006; U.S. Census

Bureau, 2003). Approximately 78% of English language learners in the public school system are of Latin American ancestry (DeRamirez & Shapiro, 2006). In 1970, only 6% of the students in public schools were identified as Latino. By 1999, that percentage had increased to 16% (La Roche & Shriberg, 2004). In 2000, more than 2 million Latino students were enrolled in high school (U.S. Census Bureau, 2000a). In 2001, Latino children comprised 18% of the population 18 years old and younger (Cabrera, Shannon, West, & Brooks-Gunn, 2006). Due to the higher than average birth rates and the immigration of people from Spanish-speaking countries, the portion of students identified as Latino is likely to continue to increase (Lee & Edmundston, 2006). It has been estimated that by 2030 approximately one fourth of the student population in the public schools will be Latino (Smith-Adcock et al.).

In 2004/2005, Latino students constituted 12.3% of the kindergarten to 12th-grade enrollment in Utah's public schools (The Education Trust, Inc., 2006), The balance of the Utah student population was 81.8% White, 1.3% African American, 3.1% Asian/Pacific Islander, and 1.5% American Indian/Alaska Native.

As the Latino population continues to grow at the present rate and reaches the predicted levels, educators will need to be knowledgeable about these students and their educational needs. An investigation into the predictive factors of success is consistent with national initiatives calling for additional research to develop programs that enhance the probability of success of a significant portion of the student population.

Academic Characteristics

Federal legislation, governmental requirements, and national initiatives from professional educational organizations have resulted in an increased effort to review the academic performance of all students (Alfaro, Umana-Taylor, & Bamaca, 2006). These influences have also generated an increase in the amount of research examining the academic characteristics of Latino students and studies directed at determining what factors lead to their academic success. Researchers have concluded that Latino students generally perform at levels substantially below nearly all other ethnic groups on measures of academic performance (DeGarmo & Martinez, 2006; Ream, 2005). To remediate this problem, predicting academic performance of Latino students is gaining interest among researchers and policymakers (Perez-Johnson & Maynard, 2007). To develop preventive strategies and implement schoolwide programs, the ability to predict math performance would be a valuable tool.

Other research that has examined the educational outcomes of Latino students also paints a grim portrait. Yowell (2002) described the situation as alarming. The average educational level of Latinos is significantly lower than the rest of the U.S. population (La Roche & Shriberg, 2004). Data published by the U.S. Census Bureau (2003) show that individuals of Hispanic ancestry also have lower levels of education relative to other racial minorities, including African Americans, Asians, and non-Hispanic Whites and commensurate with American Indians.

Latino students in Utah display similar characteristics. In a review of the 2005 National Assessment of Educational Progress assessment results, The Education Trust, Inc. (2006) reported scores from state-administered standardized testing, the Utah Core Criterion-Reference Test, showing 78% of fourth-grade students in Utah demonstrated either proficient or above proficient performance on the overall reading/English language arts performance tests. The report further showed that 68% of students in Utah demonstrated skills classified as basic and another 34% classified as proficient or above according to National Assessment of Educational Progress standards. Additional data from that publication (Utah Core Criterion-Reference Test language arts) showed that 53% of fourth-grade Latino students were proficient and the other 47% were not proficient. In 2005, the reading assessment showed that Latino students achieved the following ratings: (a) 2% advanced, (b) 12% proficient, (c) 27% basic, and (d) 59% below basic. Encouraging results from this report showed that the scaled National Assessment of Educational Progress reading scores for Latino students increased from 190 in 1998 to 199 in 2005. The increase in scores for Latino students was the largest of any reported group. Lesser levels of performance on standardized testing may be one reason Latino students have comparatively lower college enrollment levels.

College Enrollment

The absence of a high school diploma reduces or eliminates access to other educational opportunities. Disproportionate dropout rates contribute to the reasons why Latinos are one of the most underrepresented ethnic minority groups in higher education (Marotta & Garcia, 2003). Only 6% of the Latino students who begin their education in kindergarten in the United States complete a college education compared with 49% of Asians, 30% of Whites, and 16% of African Americans (Williams, 2003). A comparison among the larger ethnic minorities shows that Latino students are the least likely to enroll in and graduate from a 4-year college; it is important to note that American Indians/Alaska Natives were not included in the description of larger ethnic groups (Gibson & Bejinez, 2002). Although Latino students comprise approximately 18% of the general population 18 years old or younger (U.S. Census Bureau, 2000b), they made up only 3.6% of the undergraduate enrollment in 4-year postsecondary programs and less than 1% of graduate school students in 2004 (National Center for Education Statistics, 2007a). Of the Latino students who enroll in postsecondary institutions, approximately 60% attend a community college compared with a 4-year college or university due to, among other reasons, a lack of academic preparation (Almanac of Higher Education, 2004). According to Kane and Henderson (2006), 47% of the Latino students who entered a Hispanic-serving institution dropped out after their 1st year. Another 70% of the participants were unprepared for English 101 or Math 121 (algebra). Not participating in postsecondary education opportunities will perpetuate the disparity between levels of educational success.

Postsecondary enrollment and graduation rates in 2005, as reported by the National Assessment of Educational Progress and cited in The Education Trust, Inc. (2006), show that Utah Latino students constituted 9% of the 2-year and 3% of the 4-year college enrollment. Graduation rates of Latino students enrolled at Utah's largest public university (i.e., University of Utah) show that 30% of the 1999 freshman class graduated in 6 years or less. Six-year graduation rates at the University of Utah for other groups were 50% African American, 41% White, 40% Asian, and not applicable American Indian. The figures for statewide college graduation rates showed that 16% of Latino students completed their degrees in 4 years. In comparison, the 4-year graduation rate at the University of Utah overall was 20%, with White students at 21%, Asian students at 19%, and other students at 19%. Throughout Utah, 46% of Latino students were reportedly awarded their baccalaureate degrees within 6 years of initial enrollment. The 6-year statewide graduation rates for other groups were 51% overall, 52% White, 42% Asian, and 46% other. Lesser and lower postsecondary graduation rates for Latino students may be the result of their subordinated academic participation.

Advanced Placement Classes

Other evidence of subordinated academic participation by Latino students is their level of enrollment in advanced placement classes during high school (Riegle-Crumb, 2006). The absence of advanced placement classes on a student's high school transcript contributes to the probability of less participation in subsequent educational opportunities. Another criterion that many colleges and universities examine when determining eligibility is the students' enrollment in advanced placement or honors classes. The benefits of advanced placement enrollment may include extra points added to the students' grade point average, indicating high-quality curriculum and college credit. The 1997 freshman class at the University of California, Los Angeles had taken an average of 16 advanced placement classes (Solórzano & Ornelas, 2002). Research shows that in California Latino students comprise 68% of the overall high school student population but only 45% of the advanced placement enrollment. Without advanced placement classes on their transcripts, Latino students are at a disadvantage in terms of college acceptance. Court cases in California, *Daniel et al. v. The State of California et al.* (1999) and *Casteneda et al. v. The Regents of the University of California et al.* (1999), initiated litigation against educational institutions claiming that Latino students were denied fair access to advanced placement classes. If Latino students do not participate in the advanced curriculum in high school, they are less likely to gain admission to universities.

A specific area of relevance to the current research is the rate at which Latino students enroll in advanced placement math classes; for example, Latinos enroll in fewer advanced placement math courses in high school (Klopfenstein, 2004; Lopez, Gallimore, Garnier, & Reese, 2007). Latino students are underrepresented in advanced placement math classes and overrepresented in special education math classes (Sciarra & Whitson, 2007; Zaman, 2006). These factors contribute to the math achievement gap. Latino students enroll in advanced placement classes at approximately one half the rate of White students. Only 6.4% of Latino students participate in advanced placement math classes (Martinez-Aleman, 2006). Research has shown that not only do Latino students take fewer advanced placement math classes but they also take fewer college preparatory math classes in high school than their Asian or White counterparts (National Center for Education Statistics, 2001).

The disparity in advanced course work has been cited as a factor that contributes to the inequitable enrollment of Latino students in math, science, and engineering (Gandara, 2005). Regardless of their field of study, Latinos who attend college often lack sufficient math skills (Schoenfeld, 2002). A study conducted at Hartnell College reported that 70% of all Latino students were unprepared for entry-level college math courses (Kane & Henderson, 2006). Other research has reported that approximately 20% of male Latino college students do not successfully complete math courses taken in their freshman year (Riegle-Crumb, 2006). Failure to complete required math courses effectively terminates a student's college education. However, research does show that Latino students who follow a rigorous math curriculum can significantly reduce or eliminate those disparities (Sciarra & Whitson, 2007). The limited enrollment of Latino students in advanced placement and college preparatory math classes during high school curtails postsecondary education options, contributes to performance difficulties in college math courses, and reduces career choices. These limitations affect more than the individual.

Of all the Utah public school students in advanced placement classes in 2005, the enrollment rates for Latino students were 3% in calculus, 4% in English language/composition, and 3% in biology classes (The Education Trust, Inc., 2006). In that report, comparison figures show that students enrolled in advanced placement calculus classes were 91% White, 5% Asian, 1% American Indian, and 0% African American. The enrollment figures for advanced placement English language/ composition classes were 90% White, 4% Asian, and 0% for both American Indian and African American. Of all the students enrolled in advanced placement biology classes, the ethnic demographic data show that 90% were White and 7% were Asian.

No African American or American Indian students were reported to be enrolled in advanced placement biology classes. Enrollment data for other ethnic groups were not published. The level of academic participation by Latino students during high school, including enrollment in advanced placement classes, may contribute to graduation rates.

Graduation Rates

Research has consistently shown that Latino students have one of the highest dropout rates of any ethnic minority group, including American Indians/Alaska Natives, in the United States (Gibson & Benjinez, 2002; Laird, Lew, DeBell, & Chapman, 2006; Maldonado-Molina, Reyes, & Espinosa-Hernandez, 2006; Smith-Adcock et al., 2006). Although the dropout rate for African American and White students has recently declined, the dropout rate for Latino students has remained relatively constant over the past 25 years (Yowell, 2002). The dropout rate for Latino students nationally was 24% in 2003, more than doubling the 10% for all high school students (Laird et al.). According to La Roche and Shriberg (2004), 34% of Latino adults 18 to 24 years old are no longer enrolled in school or have not completed high school. That figure is twice the level of any other ethnic group included in the 2000 Census. The impact of graduation rates was exemplified in the results of a survey conducted in Minnesota, showing that 68% of Latino parents did not graduate from high school (Bloomberg, Ganey, Alba, Quintero, & Alcantara, 2003).

Among the ethnic/racial groups reported, Utah's Latino students had the lowest on-time high school graduation rate in the state (The Education Trust, Inc., 2006). A reported 56% of Utah's Latino students graduated on time. On-time high school graduation rates for other groups were 77% for all Utah students, 82% for Whites, 71% for Asians, and 61% for African Americans. The figure for the percentage of on-time graduation of American Indian students was not reported. When nearly one out of every four students from any ethnic group does not complete high school, there are implications within the larger society. There are costs both tangible and intangible that may be eliminated by accurately predicting the likelihood of success for any particular representative of the target population.

Retention Rates

Two of the more salient factors relevant to the educational level of Latino students are the retention and high school graduation rates. Retention and graduation are strongly correlated with achievement (Suh, Suh, & Houston, 2007; Wilson & Hughes, 2006). In general, Latino students have markedly lesser levels of achievement and a greater probability of being retained than non-Hispanic White students (Suh et al.; U.S. Department of Education, National Center for Education Statistics, 2003; Wilson & Hughes). Nearly 13% of the Latino students in kindergarten to 12th grade during the 1999 school year had repeated at least one grade. Statistics for that same year show 8% percent of the non-Hispanic White and 18% of the African American students had been retained. Retention has been shown to be strongly correlated with lower subsequent achievement, psychosocial functioning, and educational discontinuance (Suh et al.; Wilson & Hughes). It has also been reported that retention in the first grade has more negative long-term effects than when retention occurs in later grades (Pagani, Tremblay, Vitaro, Boulerice, & McDuff, 2001). Latino students who do not demonstrate proficiency in core subjects such as math are more likely to be retained and encounter the negative consequences associated with it.

For those who are concerned with the general well-being of education and society or, more importantly, specific individual students, identifying factors that are predictive of educational success is a critical task (Suh et al., 2007). Lower high school graduation rates, greater grade retention rates, lower levels of enrollment in advanced placement classes, and a disproportionate postsecondary enrollment are all evidence that Latino students are being underserved by the U.S. public education system.

Overrepresentation in Special Education

One of the most serious issues facing parents, policymakers, and public education is the overrepresentation of ethnic/racial minorities, particularly Latino students who are in special education (Artiles & Trent, 1994; Guiberson, 2009; Winzer & Mazurek, 1998). *Overrepresentation*, according to the definition in Rueda and Windmueller (2006), is defined as the presence of an unequal proportion of culturally diverse students in special education. In 2003, according to the U.S. Department of Education, National Center for Education Statistics, 7.5% of all Latino students were being served under the Individuals with Disabilities Education Act.

This issue has a 40-year history (National Research Council, 2002). According to Skiba et al. (2006), in the late 1960s, publications (e.g., Dunn, 1968) were critical of the disproportionate level of minority students in what is essentially the precursor of present-day special education. Reportedly, the greatest concern is relevant to the classifications of emotional/behavioral disorders and mild mental retardation (Skiba et al.). Regardless of the variation in the names for these disabilities by state or school district, the problem is a national concern.

Receiving special education services is not and should not be perceived as a negative experience (Osterreich & Knight, 2008). The concern reported in the literature is that American Indian and African American students are referred more frequently for special education services than are students from most other ethnic groups. Although there appears to be a consensus that minority students are disproportionately referred for and enrolled in special education, there is less agreement with regard to the reason. Skiba et al. (2006) reported that the perception that the use of objective assessments mitigates unconsciously biased tendencies has been questioned. They further proposed that although the assessments may be relatively unbiased, selection of the assessment instruments is related to the preconceived or desired results.

It has been suggested that overrepresentation might be best conceptualized as an indicator of underlying issues rather than the focus of remediation efforts (Rueda & Windmueller, 2006). Within that framework, Rueda and Windmueller cited a report from the Harvard Civil Rights Project (Oswald, Coutinho, & Best, 2002) that offered the following suggestions to address the issue: (a) increasing access to health services for poor women and children, (b) expanding early intervention programs,

(c) increasing discretionary programs of research and technical assistance under the Individuals with Disabilities Education Act, (d) improving the monitoring and enforcement of the Individuals with Disabilities Education Act, and (e) fully funding the Individuals with Disabilities Education Act.

Congruent with examining the issues underlying overrepresentation, Hosp and Reschly (2004) reported that much of the prior research had investigated demographic variables that are related to overrepresentation. The researchers acknowledged that social and economic factors were predictive of overrepresentation but suggested that there was little educators could do to directly influence those variables. Their investigation extended previous research by focusing on achievement variables and blocks of academic, demographic, and economic data independently and incrementally. For Latino students, the results showed that the demographic block was a stronger predictor for all three disability categories: (a) emotional disturbance, (b) learning disability, and (c) mental retardation. Other results from this study revealed that achievement is a strong predictor of referral and placement in special education. The academic block added significantly to 75% of the models used in the analyses. When discussing implications of the results, Hosp and Reschly were clear that academic variables are not likely to be the cause of disproportionality, only that the two are related.

Much of the research investigating the academic performance of Latino students has been centered on the disparity in the levels of achievement, the achievement gap, between Latino students and other ethnic groups (Alfaro et al., 2006; Bol & Berry, 2005; DeGarmo & Martinez, 2006; Flores, 2007; Prelow & Loukas, 2003; Ream, 2005; Tapia, 2004). Ream not only evaluated the disparities between the levels of academic achievement of Latino students and other racial ethnic groups but also examined the differences among Latino subgroups. He found that Latino students of Mexican ancestry scored significantly lower on the Stanford Achievement Tests than students of Colombian, Cuban, and Nicaraguan descent, dropped out of school at nearly double the rate of Cuban American students, and had the lowest college completion rate of any subgroup within the Latino community. Other investigations examined gender differences, concluding that *Latinos* (males of Hispanic ancestry) are at greater risk for retention and academic failure than *Latinas* (females of Hispanic ancestry; Taylor & Graham, 2007). Of particular interest to the current research was the level of academic performance of Latino students in math courses.

Math

Proficient math skills are an integral component of effective functioning in several aspects of contemporary society. Minimal ability is necessary for success not only in formal education but also in daily living and employment (Proctor, Floyd, & Shaver, 2005). Math skills relevant to financial matters such as bank balances, interest rates, and paying bills are requirements of daily living. The National Assessment of Educational Progress was established by the U.S. Department of Education as a means of reliably determining if students were learning what they should be learning (Byrnes, 2003). Results have consistently shown that many students acquire only modest levels of math skills by the time they reach the 12th grade. Underdeveloped math skills negatively impact employment, finance, and many other important life activities (Stevens, Olivarez, Lan, & Tallent-Runnels, 2004). Individuals with limited math skills are at a disadvantage when compared with those who have more developed abilities. Being able to identify students who are likely to encounter difficulties acquiring an important basic life skill is necessary in order to remediate those problems.

Academic Importance of Math

Math proficiency is also needed in more specific contexts. Math success is critical because failure to enroll or do well in math courses precludes an individual from various careers such as engineering, business, architecture, and aviation (Siegel, Galassi, & Ware, 1985). Explicit levels of math performance are mandatory for graduation from most high schools, constitute one of the subject areas measured by standardized testing designed to monitor annual yearly progress, and are key indicators of college eligibility (Cooper, Cooper, Azmitia, Chavira, & Gullatt, 2002). One of the strongest predictors of college eligibility and baccalaureate success is the sequence of math classes taken in high school (Cooper et al.; Riegle-Crumb, 2006). Students who do not successfully complete advanced placement math classes lack an important credential on their transcripts and also miss the opportunity to interact with highly qualified teachers and educationally oriented peers. The math classes taken and performance during high school are also predictive of whether a student earns an undergraduate degree (Bol & Berry, 2005). Further evidence suggests that success in collegiate math courses is strongly related to the level of math classes taken in high school. Students have a greater probability of academic success in college if their secondary education included classes that were beyond Algebra I.

Math and Latino Students

The specific area of the achievement gap most relevant to the current investigation is the disparity between Latino students' math proficiency and that of their peers. Latino students nationwide do not attain a level of math proficiency on par with other ethnic groups. Research has consistently affirmed the math achievement gap between Latino students and other groups nationwide (Bol & Berry, 2005; Flores, 2007; National Center for Education Statistics, 2007b; Stevens et al., 2004; U.S. Census Bureau, 2003).

Investigations have repeatedly concluded that Latino students are more likely to demonstrate lower performance in math. Latino students, along with African American students, typically score below their White peers in nearly every area of math performance. The situation has been described as a pipeline crisis (Lopez et al., 2007). These performance disparities are evident early. Latino students enter kindergarten with average math skills significantly lower than those of native-born, non-Hispanic White students and are similar to those of native-born African American students (Reardon & Galindo, 2007). A longitudinal study that included a significant Latino population revealed that at an average age of between 48 and 57 months Latino students' overall math scores were lower than all other ethnic groups except American Indians/Alaska Natives (Jacobson, Flanagan, McPhee, & Park, 2007). Additional results from the Jacobson et al. study showed that slightly more than half (51.4%) of the Latino students demonstrated proficiency in numbers and shapes. In comparison, the figures for other ethnic groups were 73.1% White, 54.7% Black, 81.2% Asian, 39.9% American Indian/Alaska Native, and 64.9% other. Many Latino students also demonstrate underdeveloped math skills in early elementary school, with the gap becoming wider as students progress into middle school and high school (Taylor & Graham, 2007).

The Education Trust, Inc. (2006) reported that according to the results of state-administered standardized testing, 73% of all eighth-grade students in Utah scored at or above proficient levels on the Utah Core Criterion-Reference Test, which is relevant to math performance. The results also showed that 71% of all eighth-grade students in Utah had scores at or above the basic levels and 30% were proficient or above. In comparison, Utah's Latino students' core math Criterion-Reference Test performance levels were 50% proficient and 50% not proficient. Utah Latino students' performance on the National Assessment of Educational Progress math testing resulted in performance levels of 9% proficient, 36% basic, and 55% below basic.

Latino students in Utah have demonstrated improvement. The performance of Utah's Latino students on the National Assessment of Educational Progress math testing increased 11 scaled score points between 2000 and 2005. This increase was one of the largest for any reported group and equivalent to the gain experienced by Asian students in Utah's public schools. However, even after an 11-point gain, the

Latino students' scaled scores were the lowest of any ethnic group reported. In 2005, the average National Assessment of Educational Progress math scaled score for eighth-grade Utah Latino students was 255 compared with mean scores of 279 for all students, 288 for White students, and 273 for Asian students. Scores for African Americans and American Indians were listed as not available. Compared with Latino students from other states, the average National Assessment of Educational Progress math scaled score of eighth-grade Latino students in Utah was greater than the mean scores from four other states. Latino students in Utah and across the nation demonstrate levels of math performance that are less than the vast majority of their peers.

Negative experiences in math class during elementary school are correlated to lesser proficiency in subsequent years. Latino students in elementary school consistently score below their non-Hispanic peers in math and other subjects, including reading and science (Lopez et al., 2007; Rooney et al., 2006). Reports claim that only 20% of the Latino students who are eligible enroll in 8th-grade algebra (Martinez-Aleman, 2006). In citing the results from a National Assessment of Educational Progress report on math progress, Flores (2007) stated that in 2003 Latino students enrolled in the 12th-grade exhibited the same level of math proficiency as 8th-grade non-Hispanic students. Other results of the math performance of Latino students show that approximately 87% of Latino 8th-grade students were classified as not proficient in math (National Center for Education Statistics, 2008b).

The five math content areas measured by the National Assessment of Educational Progress high-stakes testing include number properties and operations, measurement, geometry, data analysis and probabilities, and algebra (National Center for Education Statistics, 2007c). The number properties and operations content area measures students' understanding of ways to represent, calculate, and estimate with numbers. The measurement content area measures students' knowledge of measurement attributes such as capacity and temperature and geometry attributes such as length, area, and volume. Geometry measures students' knowledge and understanding of shapes in a plane and in space. Data analysis and probabilities measure students' understanding of data representation, characteristics of data sets, experiments and samples, and probability. Algebra measures students' understanding of patterns by using variables, algebraic representation, and functions. The composition of the National Assessment of Educational Progress math assessment for Grade 4 is number properties and operations (40%), measurement (20%), geometry (15%), data analysis and probabilities (10%), and algebra (15%). For Grade 8, the test composition is number properties and operations (20%), measurement (15%), geometry (20%), data analysis and probabilities (15%), and algebra (30%).

Students' performance levels on the National Assessment of Educational Progress math assessments are classified as basic, proficient, and advanced (National Center for Education Statistics, 2007c). A classification of basic denotes partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at a particular grade. The proficient classification represents solid academic performance. Students reaching this level have demonstrated competency over challenging subject matter. An advanced classification is representative of superior performance.

The National Assessment of Educational Progress classifications are based on scores resulting from a student's performance on designated math assessment tests. The scores for fourth-grade students that correspond to the National Assessment of Educational Progress classification are (a) basic (214), (b) proficient (249), and (c) advanced (289). The national average performance level of fourth-grade Latino students on the 2007 National Assessment of Educational Progress assessment is lower than for all other reported ethnic/racial groups, with the exception of Black students (National Center for Education Statistics, 2007c). The average math scores for fourth-grade students are (a) Asian/Pacific Islander (254), (b) White (248), (c) American Indian/Alaska Native (229), (d) Black (222), and (e) Latino (227). The results show that Latino students' scores are 13 points above basic, 22 points below proficient, and 62 points below advanced.

The National Assessment of Educational Progress performance-level score classifications for eighth-grade students are (a) basic (262), (b) proficient (299), and (c) advanced (333). The national average performance level of eighth-grade Latino students on the 2007 National Assessment of Educational Progress assessment is lower than for all other reported ethnic/racial groups with the exception of Black students (National Center for Education Statistics, 2007c). The average math scores for eighth-grade students are (a) Asian/Pacific Islander (296), (b) White (290),

(c) American Indian/Alaska Native (265), (d) Black (259), and (e) Latino (227). The results show that eighth-grade Latino students' scores are 2 points above basic, 35 points below proficient, and 69 points below advanced.

The results also show that as Latino students advance in school, their math performance, relative to standardized testing, declines (National Center for Education Statistics, 2007c). As fourth-grade students, the national average scores for Latino students were 13 points above the basic classification compared with 2 points above basic as eighth-grade students. As fourth-grade students, Latino students were 22 points below proficient compared with 35 points below that classification as eighth-grade students. The comparison at the advanced classification shows that Latino students were 69 points below as eighth-grade students compared with 62 points below as fourth-grade students. Additional data revealed in the report show that the gap between the scores of Latino students compared with Asian/Pacific Islander and White students does not narrow as Latino students move into the upper grade levels.

Although much has been written in the professional literature about the disparities in math performance between Latino students and other groups (Bol & Berry, 2005; The Education Trust, Inc., 2006; Lopez et al., 2007; National Center for Education Statistics, 2007c; Rooney et al., 2006), little has been published with regard to specific areas of difficulty. The literature includes a substantial body of work that compares standardized test scores or other comprehensive measurements of math performance among various ethnic groups, but few clearly illuminate specific math deficiencies. Lopez et al. reported lesser levels of achievement by Latino students in all areas of math but did not precisely define the term. Results in the Jacobson et al. (2007) study referred to an aggregate measure of overall math performance. Articles from national organizations such as the National Center for Education Statistics report performance as measured by comprehensive standardized scores but do not delineate further (National Center for Education Statistics). The National Center for Education Statistics report differentiated the levels of performance in each of the specific areas measured by the National Assessment of Educational Progress test (i.e., number properties and operations, measurement, geometry, data analysis and probabilities, and algebra) between genders but did not make the same distinction using ethnic identity as a variable. The absence of results from investigations relevant to specific areas of math performance leads to the following question: In which area of math performance are Latino students more or less proficient? This void also supports the need for the current investigation.

Despite the implementation of interventions and reform efforts designed to reduce the gap between Latino students' math achievement and their peers, the disparity persists. When improvement in math proficiency is observed, it is generally to limited basic skill areas (Rooney et al., 2006; Taylor & Graham, 2007). Some research has reported that the math achievement gap is not decreasing but is actually getting wider and, in fact, becomes more pronounced in high school. Comparatively, lower levels of math performance beginning in elementary school and continuing into high school contribute to the overall lower educational outcomes experienced by Latino students.

Predicting Math Performance

Although several empirically validated assessments measure present levels of math performance, few have been designed to predict future levels of success. Students who demonstrate lesser levels of proficiency at the time of evaluation can be offered additional support to remediate their deficiencies. Another approach to improving overall math proficiency outcomes is to predict those who might experience difficulties and then implement preventive interventions. Research has identified a number of variables believed to be predictive of math performance, including intellectual functioning, social skills, behavior, and teaching resources (Proctor et al., 2005). Other factors predictive of math performance include working memory (Swanson & Beebe-Frankenberger, 2004), auditory attention, and language comprehension (Jordan, Kaplan, Locuniak, & Ramineni, 2007).

Cognitive Factors Predicting Math Performance

Research studies have reported that just as cognitive deficits warrant a specific subset learning disability educational classification in approximately 4% to 5% of public school students, cognitive deficits also contribute to an equal number of students identified as having a math disability (Seethaler & Fuchs, 2006). The cognitive variables frequently associated with math calculation skills and math reasoning are related, in part, to the theory of intelligence the researcher endorses. Based on the Cattell-Horn-Carroll theory of intelligence, comprehension-knowledge, fluid reasoning, short-term memory, and processing speed are frequently the most significant factors predictive of math performance (Carroll, 2003; Cattell, 1963; Horn

& Cattell, 1966). Number sense, a foundational component of math proficiency, is attributable, in part, to a student's cognitive performance (Jordan et al., 2007).

Specific measures of intelligence consistent with the Cattell-Horn-Carroll framework have demonstrated varying levels of correlation with an assortment of math achievement measures (Carroll, 2003; Cattell, 1963; Horn & Cattell, 1966). Floyd, Evans, and McGrew (2003) analyzed the relationship between cognitive factors measured by the Woodcock-Johnson-III Test of Cognitive Abilities and performance on the Woodcock-Johnson-III Test of Achievement. A series of regression analyses showed moderate relationships between comprehension-knowledge and math calculation skills. The strongest relationship reported was between comprehension-knowledge and math calculation skills for participants up to age 9 years and math reasoning skills for participants after age 10 years. Other noted correlations included a moderate relationship between fluid reasoning, short-term memory, and working memory with the math achievement clusters. The results of the analyses also demonstrated a moderate relationship between processing speed and math reasoning for participants in elementary school. It was further stated that processing speed demonstrated a moderate to strong relationship with math calculation skills. Additional results showed that long-term retrieval demonstrated moderate relationships with the Woodcock-Johnson Test of Academic Achievement-Third Edition (WJ-III) math clusters when participants were very young. The final significant relationship reported was a moderate relationship between auditory processing and math calculation skills.

In a similar investigation, Taub, Keith, Floyd, and McGrew (2008) examined the influence of broad cognitive abilities on general math achievement and, more specifically, the calculation and applied problems subtests of the WJ-III. In a study designed to identify which factors representing general intelligence and Cattell-Horn-Carroll broad cognitive abilities associated with math achievement, Taub et al. reported that the first order Cattell-Horn-Carroll broad cognitive abilities have a statistically significant direct effect on math achievement for students between 5 and 19 years (Carroll, 2003; Cattell, 1963; Horn & Cattell, 1966). The broad cognitive abilities identified as highly related to math achievement were fluid reasoning, crystallized intelligence, and processing speed. Other results from this investigation showed that quantitative knowledge was highly correlated with the applied problems and calculation subtests at $r = .70$ for both.

In an investigation of capabilities for the Wechsler Intelligence Scale for Children-IV to estimate math achievement on the Wechsler Individual Achievement Test-II (Wechsler, 2002), Glutting, Watkins, Konold, and McDermott (2006) found that general intelligence and the Verbal Comprehension Index demonstrated significant influence on math achievement. Their study revealed the correlation between general intelligence and math was .77 and the correlation between the Verbal Comprehension Index and math was .17. The Full Scale IQ (FSIQ) accounted for 59.3% of the variance in the math composite score, and the four factor scores (i.e., Verbal Comprehension Index, Perceptual Reasoning Index, Working Memory Index, and Processing Speed Index) accounted for an additional 0.3% of the variance. An effect size of this magnitude, in keeping with standards reported by Cohen (1988), was described as small. Reported results did not include a comparison of individual constructs with specific subtests. In other words, no comparison was made between the FSIQ, Verbal Comprehension Index, Perceptual Reasoning Index, Working Memory Index, and Processing Speed Index and the individual measures of math performance (i.e., numerical operations and math reasoning). The results did report the relationship between the global measure of math performance and the individual measures. Correlation coefficients of numerical operations and math reasoning with math were .82 and .94, respectively. Glutting et al. stated that the additional variance accounted for by adding the Verbal Comprehension Index, Perceptual Reasoning Index, Working Memory Index, and Processing Speed Index was too small to be clinically useful. In their conclusions, it was suggested that when estimating math and reading achievement, the FSIQ might be the only score necessary to consider. This finding clearly suggests that math is more strongly correlated with general intelligence than it is with the underlying constructs measured by the four indices individually. Naglieri and Rojhan (2004) also reported that a full scale measure of intelligence is strongly correlated with performance on two math subtests of the Woodcock-Johnson Test of Academic Achievement-Revised (WJ-R; Woodcock & Johnson, 1989). According to the results of their investigation, the full scale correlation coefficients between the measure of intellectual functioning and the applied problems and calculation subtests of the WJ-R were .65 and .58, respectively. The combined results of these investigations demonstrate that overall intelligence is strongly correlated with math performance levels.

The relationship between elements of intellectual functioning, referred to as nonverbal problem solving, and language were compared with math outcomes (Fuchs et al., 2005). The elements of intellectual functioning consisted of block design and matrix reasoning subtests of the Wechsler Abbreviated Scales of Intelligence (The Psychological Corporation, 1999). The language factors included the vocabulary and similarities subtests of the Wechsler Abbreviated Scales of Intelligence and the listening comprehension subtest of the Woodcock Diagnostic Reading Battery (Woodcock, 1997). The results showed the correlations between block design, matrix reasoning, and an overall aggregate factor of nonverbal problem solving and the Woodcock-Johnson calculation subtest were at $r = .23$, $r = .19$, and $r = .25$, respectively. The results also showed the correlations between block design, matrix reasoning, and an overall aggregate factor of nonverbal problem solving and the curriculum-based measurement (CBM) computational measure were at $r = .17$, $r = .14$, and $r = .19$, respectively. In comparison, when language factors (i.e., vocabulary, similarities, and listening comprehension) were correlated with the Woodcock-Johnson calculation subtest, the results were at $r = .15$, $r = .18$, $r = .22$, and $r = .23$, respectively. The correlations between the language factors and the CBM computational measure were at $r = .01$, $r = .13$, $r = .15$, and $r = .12$, respectively.

The Wechsler Intelligence Scale for Children-IV (Wechsler, 2003) also generates a Working Memory Index that is theoretically a measurement of an individual's ability to temporarily retain information, manipulate that information, and produce a result. The Working Memory Index is correlated with math performance (Swanson & Beebe-Frankenberger, 2004). The relationship between the components of working memory and math word problem-solving proficiency were examined by Swanson and Beebe-Frankenberger. Their investigation was conducted to assess the contribution of the Working Memory Index to individual and age-related performance in children's problem-solving performance. A series of regression analyses demonstrated that working memory was substantially correlated with word problem-solving accuracy and math calculations. Other research supports the conclusion of a relationship between working memory and math performance. When investigating the intellectual correlates of solving calculation problems, Berg (2008) reported that working memory and visuospatial memory explained significant levels of the variance in math achievement.

As part of an investigation of some of the factors underlying math performance, Kyttala and Lehto (2008) examined the role of nonverbal intelligence. Within that framework, visuospatial working memory was one of the components of nonverbal intelligence examined in this study. The researchers emphasized that much of math problem solving involves visuospatial memory. On a basic level, the visuospatial position of one digit in relationship to another (e.g., 1s column compared with 10s column) is key to accurately solving computational math problems. After conducting a set of multiple regressions, the results of this investigation reported significant correlations between two measures of the visuospatial working memory and an aggregate measure of math, word problems, mental arithmetic, and geometry.

Using a nonverbal intelligence test, the Universal Nonverbal Intelligence Test (UNIT; Bracken & McCallum, 1998) has been reported to be more appropriate than other measures of intellectual functioning when evaluating the intellectual functioning of culturally diverse individuals (Fives & Flanagan, 2002). It was designed in keeping with the suggestions published in the professional literature relevant to cross-cultural assessments (Bracken & McCallum). Several reasons have been cited in support of using the UNIT compared with verbally loaded assessments. The standardization sample of the UNIT included individuals of diverse ethnic identities and community settings (e.g., urban, suburban, and rural). Participants in the standardization sample also included individuals with ethnic and culturally diverse identities. Given these attributes, the UNIT represents a more culture-fair assessment of the intellectual functioning of examinees with culturally diverse identities.

Another reason the UNIT (Bracken & McCallum, 1998) was reported to be more appropriate for use with culturally diverse populations is the administration modality (Fives & Flanagan, 2002). Although many intelligence measures require the use of receptive language, expressive language, or both, the UNIT does not have this requirement. The absence of a language component eliminates the confounds attributable to verbal miscommunication. The elimination of language barriers directly addresses one area of concern within the educational community with regard to culture-fair evaluations. The structure of the UNIT subtests, specifically the cube design and symbolic memory subtests, is culturally unbiased (Bracken & McCallum).

In addition to a student's current level of intellectual functioning, researchers have investigated other constructs that are predictive of math performance.

Language Proficiency as a Predictor of Math Performance

Language proficiency is an essential component for learning and achievement. According to Brown (1973), as cited in Pray (2005), there are three requisite criteria for demonstrating language proficiency. First, an individual must be able to use the language productively, being able to produce new utterances and recombine forms to express concepts they have not heard previously. Second, language proficiency requires an individual to be able to represent ideas, events, and objects using appropriate symbols. Third, when speaking, an individual must be able to do so abstractly and not be limited to the immediate context. Underdeveloped language proficiency negatively impacts academic performance in several core subject areas, including math and reading (Brenneman, Morris, & Israelian, 2007).

Although some Latino students may demonstrate conversational language proficiency, referred to as Basic Interpersonal Communication Skills, they may not have the requisite language skills to be successful in the academic setting (Villalba, Akos, Keeter, & Ames, 2007). In order to be successful in the academic setting, a student needs cognitive academic language proficiency. It has been estimated that the development of cognitive academic language proficiency requires 5 to 7 years compared with only 2 to 3 years for the Basic Interpersonal Communication Skills. Demonstrating adequate interpersonal communication often misleads educators. A Latino student who is able to demonstrate basic conversational skills may inadvertently cause teachers to presume that the student is able to comprehend educational materials, resulting in erroneous conclusions that the academic problems experienced by such a student are due to an emotional or behavioral disability (Perez, Skiba, & Chung, 2008). Students who demonstrate emotional or behavioral difficulties are more likely to be placed in a more restrictive environment. Due to a misunderstanding of language-related difficulties, some Latino students are at a higher risk of being unnecessarily referred for special education services or placed in a more restrictive setting.

Language proficiency, as measured by the IDEA Proficiency Test (IPT; Ballard & Tighe, 1991), has been shown to be predictive of Latino students' math performance (Lopez et al., 2007). The IPT is an individually administered assessment of language proficiency. Students who are identified as at risk for language difficulties are frequently administered the IPT in both their native language and English. Proficiency is rated as nonspeaker, limited, or fluent. Results of this study showed that English proficiency (combined with Spanish literacy) was strongly correlated with math achievement in elementary school and middle school. Based on the results of this study, it was suggested that numeracy and literacy do not occur in isolation but are related activities. Recent research has shown that English language learners regardless of race/ethnicity typically scored lower than other students whose primary language was English (National Center for Education Statistics, 2008b). Another element of language proficiency, reading proficiency, is also predictive of math performance.

Reading Proficiency as a Predictor of Math Performance

Reading knowledge gained in one language can be transferred to another, and the use of one's native language clarifies and enhances understanding and increases focus (Mace-Matluck, Alexander-Kasparik, & Queen, 1998). Other research has reported that bilingual students rely on their knowledge of the phonological, morphological, syntactic, and semantic properties of their primary language in order to develop decoding skills in a second language (MacSwan & Rolstad, 2005).

Reading and math skills are necessary to solve math reasoning or word problems (Swanson & Beebe-Frankenberger, 2004). It is necessary to understand words, phrases, and sentences in order to interpret word or story problems. Because reading skills are a requisite component for solving reasoning math problems, students with inadequate reading skills are more likely to experience difficulties (Jitendra et al., 2007).

Subtests from intellectual assessment and achievement batteries that are not direct measures of math skills have been shown to be predictive of math performance. The cognitive factors that contribute to reading disabilities are also reported to be present in students with a math learning disability (Fuchs et al., 2005). Teisl, Mazzocco, and Myers (2001) concluded that the scores from achievement assessment instruments that measure phonological processing and sound matching relate to math proficiency. The letter-word-identification subtest of the Woodcock-Johnson-Revised (WJ-R; Woodcock & Johnson, 1989), which assesses reading decoding skills by having students identify printed letters and words, was found to be correlated with levels of math achievement.

In 2005, Mazzocco and Thompson investigated how to effectively predict math learning disability. Their longitudinal study included 226 kindergarten students who were administered various formal standardized and informal assessments that measured math ability, math achievement, math-related cognitive abilities, and reading skills for the purpose of predicting math learning disability in subsequent grades. To assess the reading skills of the participant, the researchers utilized the letter-word-identification subtest from the WJ-R (Woodcock & Johnson, 1989). The word-attack subtest, also a measure of reading skill, was not included due to its age inappropriateness. Although the word-attack subtest is generally accepted as a measure of phonological decoding, the participants in this study were too young to have developed the skills assessed by that subtest. The standard score from the letter-word-identification subtest was utilized as one of the predictor variables. Included in the results of multivariate logistical regression analyses and predictive model building is the conclusion that the reading skills measured by the letter-word-identification subtest are necessary for successful math achievement.

Historically, the premise has been that the interaction between reading difficulties and math difficulties was demonstrated primarily in the context of math word problems. In a study of second-grade students who had math difficulties, reading difficulties, combined math difficulties and reading difficulties, and normal achievement levels, Hanich and Jordan (2000) observed that the math difficulties and math difficulties/reading difficulties participants demonstrated nearly equivalent performance on a standardized test of achievement in math. Participants in the combined group demonstrated greater problems with number facts, arithmetic story problems, place value, and written calculation relative to the normal achievement group. Additional results showed that the math difficulties participants demonstrated comparable skills to those of the normal achievement group on all measures of math except complex story problems. It was also noted that reading difficulties participants did not demonstrate deficiencies in story problems. This may imply that math skills are more necessary than reading skills in order to accurately solve story problems. In addition to intellectual functioning and academic ability, successful learning of math requires other classroom skills.

Behavior as a Predictor of Math Performance

Researchers have incorporated teacher ratings of students' behaviors and social skills to formulate predictions of achievement (Gresham, MacMillan, & Bocian, 1997; Gresham, Reschley, & Carey, 1987; Teisl et al., 2001). The results showed scores that were generated from behavior rating scales, social skills ratings, and language proficiency correlated with math performance. DiPerna, Lei, and Reid (2007) examined achievement as part of a longitudinal study. They reported that student behavior, described as social competency, was predictive of academic performance and suggested that there may be a causal relationship between the two.

Research has demonstrated that math achievement improved as the result of participation in a structured social skills program (Taylor & Nixon, 1996). In their study, Taylor and Nixon conducted a structured social skills program for 33 male elementary school students. After 1 year when the social skills program ended, the participants' math achievement had significantly increased. A 3-year longitudinal study also reported the benefits of social skills training as it related to math performance (Charlebois, Brendgen, Vitaro, Normandeau, & Boudreau, 2004). The results showed that the number of social skills sessions attended by the participants was positively related to math performance. In their conclusions, Teisl et al. (2001) suggested that the predictive power of teacher ratings is enhanced when used in conjunction with other more traditional screeners.

Attention is one of the classroom behaviors evaluated on the Social Skills Rating System (SSRS; Gresham & Elliott, 1989). The SSRS was utilized as an assessment of attention as part of a research study that investigated the predictive variables of math performance (Fuchs et al., 2005). The study included teachers' ratings of participants' academically related social skills as a predictor of math performance. The results showed that attention or distractibility, quantified by ratings from the teacher version of the SSRS, was the most robust predictor of outcomes on calculation (r = .41), CBM computational (r = .30), and story problems (r = .44). In addition to the classroom behavior of students, other factors of acculturation need to be examined.

Acculturation as a Predictor of Math Performance

One definition of *acculturation* is psychosocial adaptations made by members of one culture as a result of contact with another culture (Burnam, Telles, Karno, Hough, & Escobar, 1987). *Adaptations*, as used in the context of acculturation, have been defined as changes that occur over time (Ibanez, Kupermine, Jurkovic, & Perilla, 2004). The implication is that acculturation is an ongoing process that occurs over time and is related to the magnitude and extent of interaction between members of the minority and majority cultures. The implications are consistent with the theory by Ogbu (1991), as discussed in Ibanez et al.

Acculturation has been reported as a predictor of the academic performance of Latino students (Berry, 1998; Hess & D'Amato, 1996; Ibanez et al., 2004). *Language acculturation*, defined as the degree to which a student has adopted the language of the host country, was identified as one of the processes leading to acculturation (Ibanez et al.). In addition to language, generational status was also identified as a variable related to academic performance (Berry; Ibanez et al.). Generational status was defined as whether a student was born in the United States or moved to the United States after age 12. The length of U.S. residency is correlated with an individual's ability to comprehend English. Students with a limited understanding of English are more likely to encounter higher levels of academic difficulty than their more English proficient peers.

Other authors have investigated different acculturation variables associated with academic success. Hess and D'Amato (1996) researched the influence of family background. A significant body of research has investigated support as a predictor of academic performance (Alfaro et al., 2006: DePlanty, Coulter-Kern, & Duchane, 2007). Hawley, Chavez, and St. Romain (2007) reported that the stress associated with acculturation can have a negative impact on the academic success of Latino students. Stevenson and Baker (1987) reported a positive correlation between the mother's level of education and educational outcomes. Eccles and Harold (1993) concluded that parents with higher levels of education are better able to help students with homework. In a recent publication, the National Center for Education Statistics (2008b) reported that among students with proficient English language skills those whose mothers had less than a high school education scored lower than those whose mothers had a bachelor's degree.

Additional research has suggested that acculturation fails to account for the pattern of consistently lower levels of academic performance by certain ethnic minorities (Cummins, 1979). Cummins further claimed that language and cultural values do not account for the differences in academic achievement. Cummins also stated that acculturated students frequently show lower levels of academic achievement compared with their peers who maintain the use of their primary language at home. Cummins suggested that other factors had a significant impact on the levels of academic achievement among ethnic minority students, including ambivalence towards the majority culture and insecurity or shame about one's own language or culture. These results are not entirely consistent with the results from other studies.

The body of literature reporting investigations of acculturation variables is diverse. One of the challenges inherent in examining the influence acculturation has on achievement is that it is difficult to quantitatively define. Although many researchers have investigated the effects of acculturation on general achievement variables, it appears that no relevant investigations have been conducted on the effects of math performance nor on the effects acculturation has on the math performance of Latino students.

Additional Factors as Predictor of Math Achievement

The achievement levels of ethnic minority students have been the subject of a significant amount of research (Floyd et al., 2003; Suizzo & Stapleton, 2007; Taylor & Graham, 2007). Various factors have been identified as contributing or predictive of math achievement. The development of math skills has been linked to home and community variables, attention to instruction, educational resources, teacher training in math, level of maternal education, and curricular content.

Taylor and Graham (2007) investigated the influence that socioeconomic status has on the achievement levels of Latino students. The results showed that ethnic minority males from lower socioeconomic status were more likely to experience greater academic difficulty during transitional times from elementary school to middle school. Valadez (2002) also reported that the level of math achievement was highly correlated with socioeconomic status and that ethnic minority students from economically disenfranchised backgrounds were frequently referred to lesser academic tracks than were their higher socioeconomic status peers. According to the National Center for Education Statistics (2008a), approximately one half of the English language learners, most of whom were Hispanic, lived in poverty. Additional data provided in this report showed English language learners scored substantially below their English proficient peers on math tests.

One of the home environment factors that has been investigated is Latino parental involvement with the school (Kupermine, Darnell, & Alvarez-Jimenez, 2008). Parental involvement was described by Suizzo and Stapleton (2007) as a multidimensional construct that includes both direct and indirect interaction between parents and schools. Examples of direct involvement were volunteering in classrooms and attending parent-teacher conferences. Examples of indirect involvement included activities at home that are educationally related such as discussing school and family activities and conveying educational expectations. In their investigation, Kupermine et al. discussed parental involvement as a form of social capital. It has been reported that parental involvement may contribute to the way Latino middle school and high school students adjust to academic requirements. The level of parental involvement was reported as being the strongest during elementary school, then declining during middle school, and subsequently rising again during high school. Parental involvement was also linked to teacher expectations, which impact academic achievement.

Some investigations have reported that teacher expectations are based on the ethnic identity of the student (McKown & Weinstein, 2008). Results cited in their investigation included higher levels of instruction provided to those students who were expected to have greater levels of academic success. According to their results, ethnic groups associated with higher levels of teacher expectations included Asians and Europeans. Those with lesser levels of expectations included Latinos and African Americans. Results also showed that the greater the level of classroom diversity, the greater the level of student-perceived differential treatment. Students who perceived greater levels of differential treatment frequently had lesser levels of academic achievement.

Among other variables associated with academic achievement, Suizzo and Stapleton (2007) investigated the level of education of students' mothers. The results showed that maternal education level was related to higher long-term expectations. Another notable result showed that when controlling for maternal education level, Latino families had the highest level of educational expectations of any ethnic group in the study. The study contradicted much of the previous research that showed the educational expectations for Latino students were less than their White peers.

Considerable research has been conducted in identifying a host of variables that influence academic achievement. In general, most of the previous research has examined achievement levels in broad terms and has not investigated the relationship between the identified variables and a specific subject area such as math. This represents a significant limitation. Overall, academic achievement is typically measured by performance across multiple individual subject areas such as reading, writing, and math, and it is strongly influenced by performance in a particular area. As such, it is common in education to see a student who has a specific learning disability in one area and no difficulties in other areas. It is also common to see a student with learning disabilities in multiple subject areas. Additional research is needed to determine the influence these variables have on specific subject areas.

Statement of the Problem

Census data report that individuals who identify themselves as Latino constitute the single largest and fastest growing ethnic/racial minority in the public school system. Researchers largely agree that Latino students in Utah and throughout the United States demonstrate lesser levels of academic performance compared with nearly every other ethic group. Research has consistently concluded that, as a group, Latino students have a disproportionately greater number of academic difficulties than most other ethnic groups, and they experience many of the negative consequences associated with lesser levels of performance. This includes high school graduation, access to postsecondary education, employment, social productivity, economic success, and many other activities of daily living.

One of the important academic subjects in which Latino students demonstrate significant difficulty is math. The math performance level of Latino students is among the lowest of any ethnic group, and their difficulties develop early. Beginning in elementary school, Latino students generally have comparatively lower levels of math performance. Marginal success in math contributes to academic disenchantment and can lead to minimal educational attainment that, in turn, can lead to multiple lifelong struggles.

To date, most of the studies that have examined factors that predict levels of math performance have not focused on Latino students. In many previous investigations, Latino students were included as participants where the focus was on all students, not Latino students in particular. Previous research has also investigated several variables predictive of, or correlated with, math performance, but none has included comparisons of the factors in the present study. Without the ability to predict the math performance of Latino students based on a comprehensive comparison of multiple variables, the present situation is likely to worsen and an important segment of the U.S. population will continue to be underserved by public education.

Purpose of the Study

The purpose of the present study is to extend previous research relevant to predicting the math performance of Latino elementary school students. Specifically, the current research proposes to evaluate the relationship between general intelligence, measured by a culture-fair, language-free, nonverbal intelligence test, and the performance of Latino elementary school students on the math calculation and applied math problems subtests from a standardized achievement test. Prior investigations that examined Latino students' math performance focused on an aggregate measure of math ability compared with specific types of math skills and typically utilized intellectual functioning assessments that required significant verbal interactions between the researchers and the participants. The use of verbally loaded assessments of intellectual functioning and the absence of language proficiency measures limited the results of previous studies.

The present study assessed the cognitive abilities of participants using the UNIT and assessed language proficiency using the IPT oral English or Spanish as separate predictor variables of calculation and applied math problems performance. By segregating measures of language proficiency and overall intelligence, the present study will add to the existing body of knowledge by examining the relationship between these predictor and response variables. Other predictor variables that were examined include reading achievement, academic behavior ratings, and demographic factors. The present study extended previous efforts by investigating the differential relationships between multiple predictor variables and specific types of math performance. The present study also examined how these variables, either individually or in combination, can predict the level of performance of Latino elementary school students on the calculation and applied problems subtests from the WJ-III.

The results of the present study have the potential to provide important information to parents and educators by predicting the future levels of academic performance of Latino students in math computation and math reasoning. The current study will increase the ability of concerned individuals and agencies to identify Latino students who are likely to experience math difficulties and to provide educators an empirical basis to implement preventive measures, facilitate programming changes, and increase the educational attainment of Latino students.

For Latino students to experience egalitarian educational outcomes and subsequent social economic success commensurate with their peers, it is imperative that researchers investigate factors that are predictive of successful math performance. An empirical study identifying factors that predict math performance of Latino students can provide useful information for prevention and early intervention. Accurate identification of predictive factors is a crucial step needed to improve the level of math proficiency in the nation's largest ethnic minority.

Research Questions

Research Question 1

Which factors, intellectual functioning, language proficiency, reading proficiency, behavior, acculturation, or a combination of factors, most accurately predict the level of math computational performance of Latino elementary school students? Based on the literature review (Glutting et al., 2006), it was hypothesized that intellectual functioning would be the most accurate predictor of math computational problems performance. Taub et al. (2008) also reported similar results that showed a strong correlation between elements of intellectual functioning and levels of math computational performance. This hypothesis is based on the strength of the correlation between intellectual functioning and math performance previously reported. Results have shown that general intelligence accounted for a significant proportion of the variance in math performance (R^2 = .59). In comparison, verbal skills, as measured by the Wechsler Intelligence Scale for Children-IV, accounted for a substantially smaller proportion (R^2 = .03) of the variance. Additional research by Fuchs et al. (2005) showed a correlation (R^2 = .05) between the Wechsler Abbreviated Scales of Intelligence block design subtest and the Woodcock-Johnson calculation subtest. However, the hypothesis is tempered by the absence of a comprehensive comparison of the other variables proposed in the current investigation. Prior studies did not include comparisons of predictor variables measured by the present investigation. Conclusions of previous researchers have stated that the FSIQ may be the only intellectual construct that needs to be measured in order to predict math performance, but it failed to address the influence of other strongly correlated variables. Previous research has also reported that additional intellectual constructs such as memory, retrieval, attention, planning, and problem solving are predictive of math performance. Although correctly solving math computational problems requires various cognitive abilities and is correlated with additional skills, given the amount of variance accounted for by intellectual functioning as reported previously, the hypothesis that math performance is less dependent on language, reading, or social skills is well supported. Figure 1 illustrates the hypothesized interactions among intellectual functioning, language proficiency, reading proficiency, academic behavior ratings, and level of math computational performance.

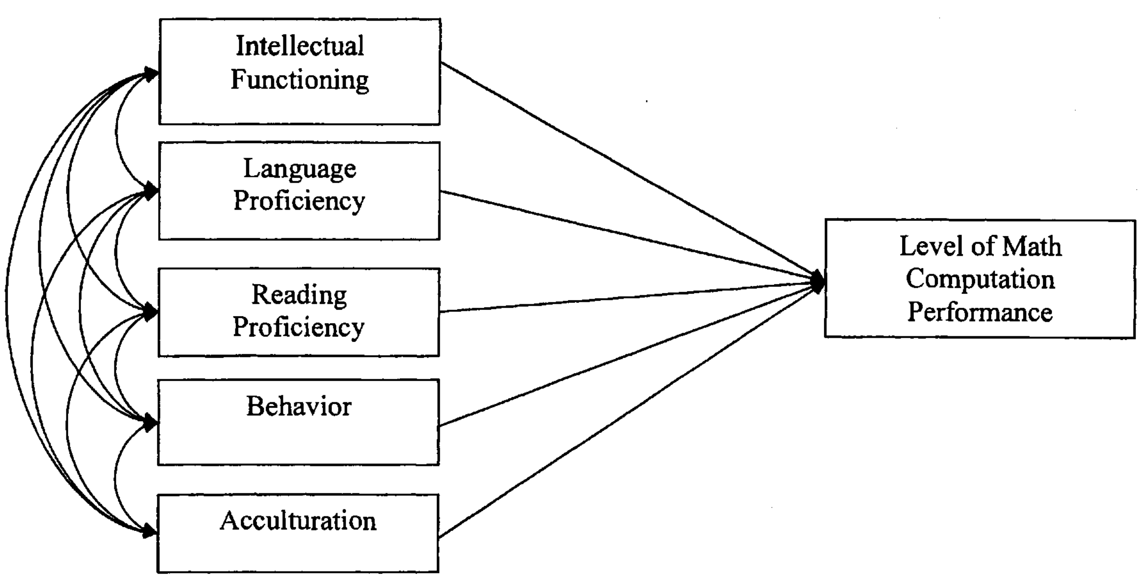

Figure 1. Hypothesized effects of intellectual functioning, language proficiency, reading proficiency, behavior, acculturation, and level of math computation performance level.

Research Question 2

Which factors, intellectual functioning, language proficiency, reading proficiency, behavior, acculturation, or a combination of factors, most accurately predict the level of math reasoning performance of Latino elementary school students? As stated in Research Question 1, it was hypothesized that intellectual functioning would be the most accurate predictor of math reasoning problems performance. Previous research reported that intellectual constructs such as memory, retrieval, attention, planning, and problem solving are also predictive of math performance. It was further hypothesized that reading ability and language proficiency would be strong predictors of math reasoning performance. Correctly solving math reasoning problems requires cognitive abilities and is more dependent on language proficiency and reading skills. Figure 2 illustrates the hypothesized interactions among intellectual functioning, language proficiency, reading proficiency, academic behavior ratings, and level of math reasoning performance.

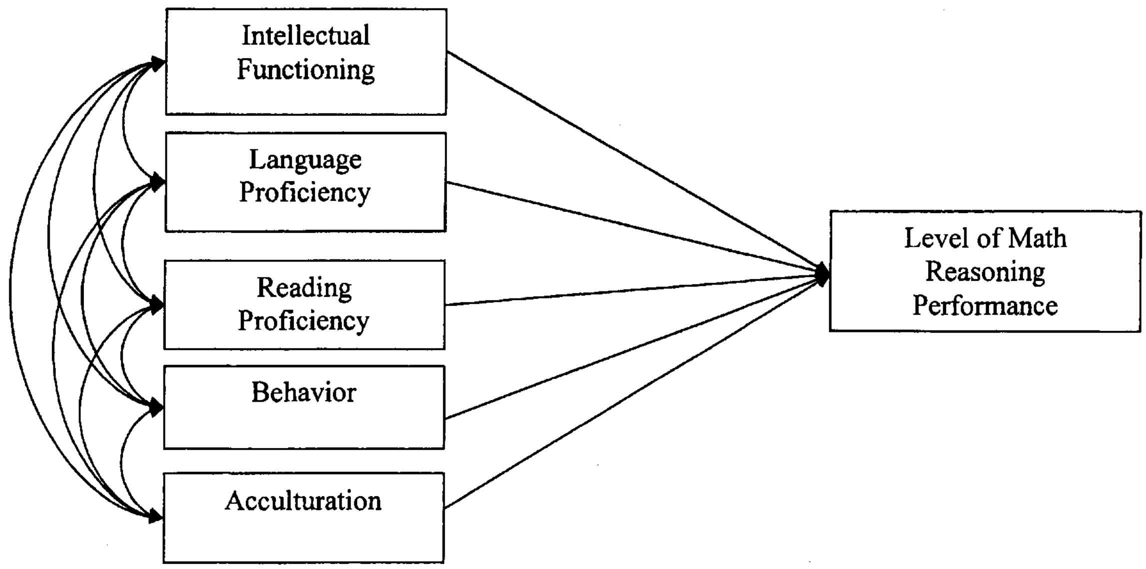

Figure 2. Hypothesized effects of intellectual functioning, language proficiency, reading proficiency, behavior, acculturation, and math reasoning performance level.

CHAPTER 2

METHODOLOGY

Participants

The participants were 87 Latino students enrolled in Grades 4, 5, and 6 in an urban Salt Lake City, Utah, elementary school.[1] Data with regard to the students' prior educational experience and exposure to math curriculum were not available. The data for this study were drawn from a larger study designed to identify predictors of educational success for Latino students. The larger study was funded by a grant from the U.S. Department of Education, Office of Special Education Programs. Although the primary focus of the grant was on Latino students with emotional/behavioral disorders compared with their peers without emotional/behavioral disorders, no students with emotional/behavioral disorders were included in the participant sample for the current study.

Setting

The study was conducted in an urban elementary school in the western United States. The student population of the school at the time of the current study was 68% Latino. Based on receiving free or reduced lunch, it was determined that 92% of the

---

[1]Of the 102 Latino students in Grades 4, 5, and 6, 93 (91.2%) returned signed consent and assent forms. Due to attrition and incomplete data, the final sample included 87 students.

Latino students were economically disadvantaged. A majority of the participants (57.5%, n = 50) were born in the United States. Of the 37 participants who emigrated to the United States, most came from Mexico (91.1%, n = 34). The primary language of the participants' parents was Spanish, with most having limited English proficiency. The demographics of this school population were analogous to other schools in the same district. The school was composed of 51% ethnic minority students of which 40% were Latino (State Office of Ethnic Affairs, 2004).

Procedures

The research plan was submitted to the Institutional Review Board. After review, permission to proceed with the project was granted. The Salt Lake City School District was contacted and permission was granted to conduct the research. A specific school was designated and communication with the staff was established.

A research team was formed after interviewing potential candidates. The research team consisted of a project director, a university faculty member, and four student research assistants. All research assistants were enrolled in a graduate program. I held a master of arts degree in clinical psychology and was in my 2nd year of the doctoral program in school psychology. The three other research assistants held an undergraduate degree and were at varying levels in their respective graduate programs. The initial research team consisted of a faculty advisor and six graduate assistants. The faculty advisor held a doctorate in special education. The research assistants were enrolled in graduate school. The research team met weekly for planning purposes and to discuss progress.

Responsibilities were assigned based on education, training, and specific areas of interest. The responsibility of directly communicating with parents was assigned to team members who were fluent Spanish speakers. As part of the direct communication component, a series of public meetings for the participants' families were held at the school to provide information with regard to the research project and to answer questions. The meetings were held at various times and on different days of the week in order to offer families several options to attend. Informed consent forms were developed in accordance with institutional policy. These forms were written in both Spanish and English and were distributed to parents during the informational meetings.

In the course of one of the early team meetings, a demographic questionnaire was developed (see the Appendix). The questionnaire was collaboratively developed to gather social, economic, educational, familial, and occupational data from the participants and their families. The questionnaire was written in both Spanish and English; it was distributed to participants' families by way of informational meetings held at the school or sent home with the participants. Follow-up telephone calls were made to collect information from families who did not return the questionnaire to the school. The telephone calls were made by the research assistants who were fluent in Spanish. In a limited number of cases, Spanish-speaking research assistants made in-home visits with some families in order to obtain the demographic data.

One research assistant, designated as the student leader, coordinated various aspects of the project and served as a liaison between the research team and the school. The lead student research assistant, in cooperation with the school staff, developed a master list and assessment schedule containing names of the participants, classroom assignments, and research assistant responsibilities; the schedule was distributed to the rest of the research team. The school administration assigned specific rooms for assessments. The master list was used to assign individual participants and classrooms to specific research assistants and to monitor the progress of the assessments. The research team members signed up for specific days listed on the assessment schedule to conduct their respective testing. Actual testing assessments were conducted according to the master schedule in the assigned rooms. When a research assistant completed an assessment, he or she made a notation on the master schedule. In addition, progress was discussed during the weekly meetings.

During the first research team meeting, it was decided that additional formal meetings would occur weekly. The purpose of the weekly meetings was to discuss relevant issues, answer questions, and monitor progress of the project. Other informal meetings were held on an as-needed basis.

Specific assessment responsibilities were determined based on training. I administered the UNIT to all participants. Responsibilities for administering the WJ-III were shared among three research assistants and me. The teacher, parent, and student versions of the SSRS were distributed to the respective raters by the lead research assistant. Completed SSRS rating forms were returned to a designated mailbox in the main office of the school. The IPT oral English and oral Spanish were administered by research assistants who were fluent in Spanish.

I was also assigned the responsibility of training other members of the team to administer the WJ-III. The training sessions included an overview of the WJ-III subtests and constructs theoretically assessed by each subtest. Training also included demonstrations of the proper administration procedures. Team members practiced administration of the WJ-III with each other and other individual volunteers. Each team member was asked to administer the applicable subtests a minimum of three times. After each team member demonstrated proficiency in the administration of the WJ-III, as determined by the project leader, they began assessing participants. During initial administrations of the achievement battery, I observed and assisted the newly trained team members.

Each assessment (i.e., UNIT, WJ-III, SSRS, and IPT) was scored by the research assistant who had administered them, and the scores were subsequently recorded in the research team database by that research assistant. Demographic data were recorded by the lead student researcher. All data were recorded on a designated personal computer in a university research office. Research assistants recorded data as their schedules permitted. A formal schedule for data recording was deemed unnecessary.

Data were recorded in a Microsoft Excel spreadsheet and later converted to a Statistical Package for the Social Sciences, Version 15, file for analyses. The participants' names made up the rows and the variables made up the columns. All data for each participant were recorded in the columns following his or her name.

Data Collection

Achievement

Depending upon the participants' language proficiency, defined by the greater IPT score, either the WJ-III (Woodcock, McGrew, & Mather, 2001) or the Bateria-III Woodcock-Munoz (Bateria-III; Woodcock, Munoz-Sandoval, McGrew, & Mather, 2003) was used to assess the participants' academic achievement. Participants who demonstrated greater proficiency in English, an IPT oral English score greater than an IPT oral Spanish score, were administered the WJ-III. Conversely, those participants who displayed greater language proficiency in Spanish, an IPT oral Spanish score greater than an IPT oral English score, were administered the Bateria-III. The Bateria-III is equated with the WJ-III and was developed to assess the achievement of Spanish-speaking students. Both achievement batteries are highly utilized, individually administered, standardized, age-based, norm-referenced measures of academic performance composed of 22 subtests designed to identify and describe an individual's academic performance.

Extensive studies and analyses have been conducted to evaluate the reliability of the WJ-III (Woodcock et al., 2001). The reliability coefficients were calculated for each subtest of the WJ-III using a split-half procedure. Individual subtest items were divided into two groups, with the odd-numbered items comprising one group and the even-numbered items comprising the other group. Reliability was calculated for all subtests across their range of intended use and included all participants. The mean subtest correlation coefficients for the age groups included in the current study were the following: (a) letter-word-identification, $r = .94$; (b) calculation, $r = .84$; (c) spelling, $r = .89$; (d) passage comprehension, $r = .91$; (e) applied problems, $r = .92$; and (f) writing samples, $r = .85$.

Studies establishing validity of the WJ-III reading measures were conducted by the correlating cluster scores or individual subtest scores of other achievement batteries (McGrew & Woodcock, 2001). Studies were conducted comparing the correlations between reading, writing, and math measures of the WJ-III with the same measures on the Kaufman Test of Educational Achievement (Kaufman & Kaufman, 1985) and the Wechsler Individual Achievement Test (Wechsler, 1992). The results showed that the achievement measures of the WJ-III were strongly correlated with the subtests or domains of both the Kaufman Test of Educational Achievement and the Wechsler Individual Achievement Test.

An examinee's performance on each subtest produces a raw score that is converted to a standard score ($M = 100$, $SD = 15$). For purposes of the current investigation, six subtests were administered to assess participants' levels of performance in three key academic areas, including reading, writing, and math. The subtests administered to the participants included (a) letter-word-identification and passage comprehension for reading, (b) spelling and writing samples for writing, and (c) applied problems and calculation for math.

The WJ-III and Bateria-III technical manuals (McGrew & Woodcock, 2001; Woodcock et al., 2003) provide extensive details of empirical evidence validating the technical adequacy and interpretation of the subtests of the WJ-III and Bateria-III.

Brief descriptions of the selected subtests utilized in the present study are provided in the following sections.

Math Performance

The measures of math performance used for the present research were the applied problems and calculation subtests of the WJ-III. The WJ-III math subtests have been used to measure different aspects of math achievement in previous investigations (Floyd et al., 2003; Proctor et al., 2005; Taub et al., 2008). In each of the investigations, the applied problems subtest was used to measure math reasoning performance and the calculation subtest was used to measure computational performance.

Math Reasoning

One definition of math reasoning is the ability to solve problems using various math-related skills, including knowledge of math operations, numerical relationships, and quantitative concepts (Proctor et al., 2005). The WJ-III applied problems subtest can be considered a measure of math reasoning because it requires the examinee to solve orally presented math word problems. Examinees are allowed to use paper and pencil, if necessary. Items at the beginning of the subtest are simple word problems that require the examinee to display the correct number of fingers in response to a verbal prompt from the examiner. Subsequent problems require the examinee to demonstrate the ability to count the number of specific objects. As the problems progress, an examinee is required to demonstrate the ability to tell time using an analogue clock, read the temperature of a thermometer, and add the value of coins. Many of the items on the applied problems subtest are accompanied by a picture or other visual display.

Higher-numbered problems of the applied problems subtest are presented in short essay form. The examinee reads word problems along with the examiner as each test item is presented. The word problems require the examinee to identify relevant information, determine the appropriate math operation, and calculate an answer. Examinees are awarded one point for each correct answer and no points for incorrect responses. An examinee's points are added together to obtain a raw score that is converted to an age-based standard score (*M* = 100, *SD* = 15).

In an investigation similar to the current study, Taub et al. (2008) used the applied problems subtest of the WJ-III as a dependent variable measuring math achievement. Proctor et al. (2005) also used subtests from the WJ-III, including the applied problems subtest to evaluate the math reasoning levels of participants in their study.

Computation

Math calculation skills have been defined as using math operations, including addition and subtraction, and following basic math rules to solve math problems (Proctor et al., 2005). Consistent with this definition, the WJ-III calculation subtest involves arithmetic computation with paper and pencil. Calculation problems range from simple addition and subtraction to advanced algebra and calculus. Lower-numbered problems are single-digit addition and subtraction problems. As the examinee advances to higher-numbered problems, two-digit numbers are either added or subtracted. The items on the calculation subtest continue to increase in complexity to include single-digit multiplication, multiple-digit addition, simple division, more complex division, adding fractions, calculating square roots, determining slope and intercept, and trigonometry. Examinees are awarded one point for each correct answer and no points for incorrect responses. An examinee's points are added together to obtain a raw score that is converted to an age-based standard score (M = 100, SD = 15).

To determine which students demonstrated math calculation skills in the lowest 16th percentile, Proctor et al. (2005) used the math cluster scores from the WJ-III. The calculation subtest was used to evaluate the math computational skills of participants in the current study.

Reading Performance

Participants' reading achievement was measured using select subtests of the WJ-III and curriculum-based reading measures. The subtests from the WJ-III included the letter-word-identification and passage comprehension.

Letter-Word-Identification

Letter-word-identification assesses reading decoding by having the student pronounce individual letters and words in isolation. The examinee names letters and reads words aloud from a list. The starting point is based on an estimate of the examinee's current reading level. Less difficult test items require the examinee to correctly identify a single letter among four alternatives. As the level of difficulty increases, the examinee is required to point to individual letters presented in a line. More difficult items require the examinee to correctly pronounce individual words. An examinee earns one point for each correct answer and no points for incorrect responses. When pronouncing words, the examinee must say the word fluently. Pronouncing a word disjointedly, phoneme by phoneme or syllable by syllable, is considered an incorrect response. Examinees are awarded one point for each correct answer and no points for incorrect responses. An examinee's points are added together to obtain a raw score that is converted to an age-based standard score (M = 100, SD = 15).

Passage Comprehension

The WJ-III passage comprehension subtest assesses printed language comprehension by having the examinee read a written passage and then identifying a missing key word that makes sense in the context of that passage. All examinees who can read at Grade 1 begin with the same test item. Other examinees who cannot read at that level are administered a sample item; the starting point is determined based on the response and an estimate of the examinee's present level of reading achievement.

The passage comprehension subtest items are presented in an order of ascending difficulty. Less difficult items are presented initially and require examinees to point to a picture that represents the stimulus word or phrase. As test items become more challenging, examinees are required to orally supply a word that is missing from each sentence or a brief paragraph. Acceptable responses are visible to the examiner.

The examinee is awarded one point for each correct response and no points for incorrect responses. The examinee is awarded one point for each correct answer and no points for incorrect responses. The examinee's points are added together to obtain a raw score that is converted to an age-based standard score (*M* = 100, *SD* = 15).

Curriculum-Based Measurement

A CBM of reading was also used to assess the participants' reading fluency. The number of words read (aloud) correctly per minute has been recognized as a valid measurement of oral reading fluency (Fuchs, Fuchs, Hosp, & Jenkins, 2001). The collection of words read (aloud) correctly per minute data requires students to read a passage aloud for a specified period of time (e.g., 1 minute), and an examiner records the number of words read correctly. Often, the examiner also records the number of errors a student makes. Nationally recognized reading assessment programs such as the Dynamic Indicators of Basic Early Literacy Skills (Good & Kaminski, 2002) and the "AIMSweb Progress Monitoring and Response to Intervention System" (2006) use words read (aloud) correctly per minute as a measure of reading proficiency.

Substantial research has examined the properties of the CBM and determined that it is a valid (i.e., concurrent, construct, and criterion related) and reliable measure of general reading ability (Hosp, Hosp, & Howell, 2007). According to the information provided by "AIMSweb Progress Monitoring and Response to Intervention System" (2006), validity studies have shown the mean correlation of the CBM to the McMillan Series at grade level (r = .71); Harcourt-Brace-Jovanovich basal reader at grade levels 6 and 7 (*r* = .75 and *r* = .60, respectively); Ginn and Scott-Foresman basal readers from each level (*r* = .91); and authentic- and literature-based basal readers at grade levels 1 to 5 (*r* = .67 and *r* = .64, respectively).

Other studies reported by the "AIMSweb Progress Monitoring and Response to Intervention System" (2006) reveal the CBM test-retest reliability data as strong (*r* = .90) based on 10 parallel forms administered 1 week apart. Additional reliability data show other test-retest studies that administered four parallel forms 1 week apart for 5 weeks resulted in correlation coefficients between .89 and .84. Further evidence of reliability reported results from two parallel forms administered simultaneously as *r* = .94.

Intellectual Functioning

Intellectual functioning was measured using the abbreviated battery of the UNIT (Bracken & McCallum, 1998). The abbreviated battery of the UNIT consists of two subtests: (a) cube design and (b) symbolic memory. The UNIT is a nonverbal, standardized, norm-referenced measure comprised of a set of individually administered, specialized tasks designed to measure the intellectual functioning of individuals between 5 and 17 years old. The normative sample of 2,100 participants closely matched the demographics of the United States at the time of standardization in 1995.

Full Scale IQ

Most of the investigations previously discussed, which examined the relationships between various elements of intellectual functioning and math skills, typically used cognitive assessments that required expressive and receptive language skills. In general, the previous investigations used measures of intelligence that required considerable verbal interaction between the examiner and examinee. Research of this nature has inherent limitations. A verbally loaded assessment of intellectual functioning limits the opportunity of participants with language or verbal deficiencies to fully demonstrate their cognitive skills. The requisite expressive and receptive language components may have prohibited individuals from culturally diverse backgrounds from fully comprehending directions and providing complete responses on some test items. The obvious result may have been an inaccurate evaluation of the examinee's true intellectual functioning. Subsequent analyses may have also been compromised.

The use of a nonverbal assessment of general intelligence such as the UNIT (Bracken & McCallum, 1998) measures intellectual functioning and simultaneously eliminates the covariance produced by language proficiency when conducting regression analyses between math performance and intellectual skills. Isolating the language and intellectual functioning variables allows both variables to be measured separately. Eliminating the overlap of these two predictor variables has the potential to result in a more accurate correlation of both predictor variables and math performance response variables.

The UNIT was developed, in part, for the purpose of assessing the intellectual functioning of individuals who may be disadvantaged by using verbally loaded cognitive assessments (Bracken & McCallum, 1998). The UNIT has been described as a nonverbal intelligence assessment with exceptional promise (Hooper & Bell, 2006). Others have concluded that the UNIT is a theoretically driven and psychometrically sound assessment of intelligence appropriate for use with examinees who cannot be accurately evaluated using traditional verbal methods (Fives & Flanagan, 2002). Many of the commonly used intellectual assessment instruments typically require considerable verbal interaction between the examiner and the examinee; however, the UNIT must be administered without verbal directions. Verbal communication between the examiner and the examinee is permitted provided it is not instructional. The examiner communicates the procedures through the use of pantomime, gestures, and nonverbal demonstrations. The examinee can complete the tasks without speaking. Language spoken by the examinee does not increase or decrease scoring. Scoring is based on a visual inspection of the response by the examiner. An examinee's performance on each subtest results in a raw score that is converted to an age-appropriate scaled score (M = 10, SD = 3). The subtest scores are combined to determine a full scale measure (FSIQ) of intellectual functioning that is converted to an age-based standard score (M = 100, SD = 15).

The UNIT has been compared with the Wechsler Intelligence Scale for Children (Wechsler, 1991) and described as an adequate measure of general intelligence (Fives & Flanagan, 2002). The structure of the UNIT is such that general intelligence is positioned at the top of the pyramid and incorporates at least two primary factors of intelligence (i.e., memory and reasoning) in the hierarchy. In addition, the UNIT theoretically assesses other cognitive processes reflective of general intelligence, including planning, evaluating, and mediating symbolic and nonsymbolic stimuli. Confirmatory and exploratory factor analysis research has shown that the symbolic memory subtest loads on both the long-term retrieval and fluid reasoning factors. The cube design subtest also loads on the fluid reasoning factor.

Subsequent to the standardization sample, an additional 1,765 individuals participated in reliability, validity, and fairness studies (UNIT; Bracken & McCallum, 1998). Concurrent validity studies compared the UNIT with other nonverbal tests: (a) Raven's Standard Progressive Matrices (Raven, 1960), (b) Matrix Analogies Test (Naglieri, 1985), and (c) Test of Nonverbal Intelligence (Brown, Sherbenou, & Johnsen, 1990). The results of these studies revealed the correlations of the UNIT abbreviated battery FSIQ were $r = .79$, with the Matrix Analogies Test total score at $r = .50$, Raven's Standard Progressive Matrices total score at $r = .68$, and Test of Nonverbal Intelligence Quotient. The authors also compared the UNIT abbreviated battery with the Kaufman Brief Intelligence Test (Kaufman & Kaufman, 1990). This study provided evidence of concurrent validity. The correlation between the FSIQ from the UNIT abbreviated battery and the Kaufman Brief Intelligence Test, both of which are intended to be used as screeners of intellectual functioning, was $r = .71$.

Reliability studies reported in the examiner's manual (Bracken & McCallum 1998) show that the average reliability statistics for the UNIT abbreviated battery standardization were r = .91 for the FSIQ, r = .85 for symbolic memory, and r = .91 for cube design. Test/retest reliability statistics were reported as r = .83 for the FSIQ, r = .72 for symbolic memory, and r = .85 for cube design. The individual subtests are described in the following sections.

Cube Design

The cube design subtest, in theory, is primarily a measure of visual-spatial reasoning (Bracken & McCallum, 1998). Other primary abilities presumed to be assessed by the cube design subtest include abstract thinking, analysis, attention to detail, evaluation, holistic processing, nonsymbolic mediation, nonverbal reasoning, perception of abstract stimuli, perceptual organization, reasoning, reproduction of a model, simultaneous processing, spatial orientation, synthesis, three-dimensional representation, and visual motor integration. Working under time constraints is a secondary ability reportedly assessed by the cube design subtest.

During the administration of the cube design subtest, an examinee is provided with an appropriate number of identical cubes ranging from one to nine. The cube(s) are all green on two sides, all white on two sides, and half green and half white on the other two sides. For each trial, the examinee is presented with a pictorial stimulus design and then directly reconstructs that design on the stimulus book or the response mat. The examiner uses a stopwatch or similar device to record the amount of time the examinee requires to complete the task. For some items, bonus points can be awarded for faster completion.

Symbolic Memory

The symbolic memory subtest is theorized as a measure of attention to detail, concentration, complex sequential memory for meaningful material, perception of meaningful stimuli, sequential processing, symbolic mediation, verbal mediation, and short-term visual memory. Secondary abilities theoretically measured by the symbolic memory subtest include concept formation, perceptual organization, and visual motor integration (Bracken & McCallum, 1998).

During administration of the symbolic memory subtest, the examinee views a stimulus page for a period of 5 seconds. The examiner covers the stimulus page and the examinee re-creates the observed sequence using the symbolic memory response cards. Ten response cards (5 green and 5 black) are universal symbols for baby, girl, boy, woman, and man. A correct response requires the examinee to select the correct response card and arrange these cards in the exact sequence shown on the stimulus page.

Language Proficiency

Participants' language proficiency was assessed using both the IPT oral English and the IPT oral Spanish (Ballard & Tighe, 1991). The participants' language proficiency ratings were used to determine which academic achievement instrument was used in the current study. The determination was based on which score (IPT oral English or IPT oral Spanish) was highest. A student with an IPT oral English score greater than an IPT oral Spanish score was administered the WJ-III. A student with an IPT oral Spanish score greater than his or her IPT oral English score was administered the Bateria-III.

The IPT is among the most commonly used language proficiency assessments by school districts across the United States to determine eligibility for English as a second language services (Ochoa, 1996). The IPT was designed to evaluate the language proficiency of children in kindergarten to Grade 6. Key language areas assessed by the IPT oral English and IPT oral Spanish include syntax, morphological structure, lexical items, and phonological structure (Ballard & Tighe, 2006a, 2006b). The assessment is divided into six levels, with students advancing through all levels or until they are no longer able to proceed due to the limitations of their language proficiency. When a student reaches his or her highest proficiency level, the examiner uses the IPT level (Grades 1 to 6) and the student's grade (kindergarten to Grade 6) to determine an IPT designation. The IPT English language proficiency levels are non-English speaking, limited English speaking, and fluent English speaking. The IPT Spanish language proficiency levels are the same.

The normative sample for each of the proficiency versions included participants from 8 states for the Spanish version and 11 states for the English version (Ballard & Tighe, 2006a, 2006b). Nine hundred forty-eight students for the Spanish version and 891 students for the English version participated in the standardization process. The gender distribution was approximately an equal number of males and females. The ethnicity demographics were 76.2% Hispanic for the English version and 99.9% Hispanic for the Spanish version.

The IPT oral English and IPT oral Spanish have undergone extensive validity and reliability studies (Ballard & Tighe, 2006a, 2006b). For each version, validity and reliability have been established by thorough examinations of construct, content, and criterion validity. The content validity of the IPT oral English was established by examining the relationship between the items and the six domains (i.e., syntax, lexicon, phonology, morphology, comprehension, and oral expression). Mean content validity percentages for Forms E and F were syntax (57%), lexicon (96%), phonology (77.5%), morphology (30.5%), comprehension (100%), and oral expression (86.5%). Criterion validity was examined by comparing the correlation of teacher predictions of IPT score levels with IPT results. When Forms E and F were combined, the correlation coefficient was r = .78. The construct validity of the IPT oral English was based on linguistic performance and underlying constructs. The constructs were as follows: (a) Language is developmental, incremental, systematic, and symbolic; (b) language is used to communicate in a social context; and (c) language involves both receptive and productive skills. Correlation coefficients for the various forms of the IPT oral English range from r = .38 to r = .43. Reliability has been confirmed as a result of comprehensive examinations of internal consistency and test-retest studies. Internal consistency was established by determining Cronbach's alpha. Results of the internal consistency evaluation report Cronbach's alpha as .99. Test-retest studies revealed the average Pearson's r = .84. Alternate forms of reliability studies show that when participants were administered alternate forms of the IPT 2 weeks after completing the first form, the average Pearson's r = .89. Correlational studies comparing Forms C and D with Forms E and F show Pearson's r = .87 and Cramer's V = .74.

Content validity of the IPT oral Spanish was established by examining the relationship between test items and the six categories, including syntax, lexicon, phonology, morphology, comprehension, and oral expression (Ballard & Tighe, 2006a, 2006b). The results show the following content validity percentages: syntax (74%), lexicon (99%), phonology (86%), morphology (79%), comprehension (100%), and oral expression (97%). Criterion validity of the IPT oral Spanish was evaluated by examining the correlation between teacher prediction of IPT score levels and IPT results. The results show that Pearson's r = .72. The construct validity of the IPT oral Spanish was based on linguistic performance, and the underlying constructs that language is developmental, incremental, systematic, and symbolic is used to communicate in a social context, and involves both receptive and productive skills. Correlation coefficient for the IPT oral Spanish age by IPT level was r = .49, grade by IPT level was r = .52, teacher opinion by IPT level was r = .28, teacher opinion of Spanish reading ability by IPT level was r = 49, teacher opinion of Spanish writing ability by IPT level was r = .46, and teacher opinion of Spanish oral language ability by IPT level Cramer's V = .57. Internal consistency reliability studies showed the IPT oral Spanish Cronbach's alpha = .99. Test-retest reliability results show Pearson's r = .72. Complete descriptions of the IPT technical adequacies are available in the respective technical manuals.

Behavior Ratings

Three versions (i.e., parent, teacher, and student) of the SSRS (Gresham & Elliott, 1990) were completed for each participant. The SSRS is a multiple rater, standardized, norm-referenced, widely used measure of the social skills, problem behaviors, and academic competence of kindergarten to 12th-grade students. When all three versions are used in combination, the results form an integrated assessment of perceived abilities of students across three primary domains of school-related functioning: (a) social skills, (b) problem behaviors, and (c) academic competence. In addition, ratings from the SSRS result in scores on three other scales: (a) externalizing behaviors, (b) internalizing behaviors, and (c) hyperactivity.

Within the three versions (i.e., parent, teacher, and student) of the SSRS are separate gender and grade versions. Grade versions for both genders include preschool (ages 3-0 to 4-11), elementary school (kindergarten to Grade 6), and secondary school (Grades 7 to 12). All items, regardless of version, are rated according to the same scale: 0 = *never*, 1 = *sometimes*, and 2 = *very often*. Standard scores are determined from responses and are used to calculate an age- or grade-based standard score (M = 100, SD = 15). All three versions of the SSRS produce a standard score for social skills. The parent and teacher versions produce a standard score for problem behaviors. The teacher version of the SSRS also produces a standard score for the academic competence domain.

For purposes of the present study, the participating parents, teachers, and students completed their respective version of the SSRS. Results from the completed protocols included standard scores for the social skills, problem behaviors, and academic competence domains as described previously. Analyses for the current study utilized only standard scores from the social skills domain even though the standard scores from the other domains were available. Social skills is the only domain that is included on all three versions of the SSRS. Using only social skills standard scores was predicated on inclusion of participant-based data relevant to behavior similar to the elements of a typical comprehensive eligibility evaluation.

Validity was established by correlational comparisons between the SSRS and other social skills or behavior rating scales (Gresham & Elliott, 1990). In comparison to the Social Behavior Assessment (Stephens, 1978) and the Child Behavior Checklist, Teacher Form (Achenbach & Edelbrock, 1983), the SSRS was strongly correlated with both. In one of the validity studies comparing the SSRS Teacher Form with the Social Behavior Assessment, the correlation ranged from -.15 to -.73 for the social skills subscales, from .01 to .57 for the problem behaviors subscales, and from -.37 to -.72 for the academic competence scale. Total scale correlations were -.68 for social skills, .55 for problem behaviors, and -.67 for academic competence. In another validity study, the SSRS was compared with the Child Behavior Checklist, Teacher Form. The externalizing scores from both measures were highly correlated, $r = .75$. The SSRS problem behaviors total score and Child Behavior Checklist, Teacher Form total score were also highly correlated, $r = .81$. The SSRS internalizing score was moderately correlated with the Child Behavior Checklist, Teacher Form internalizing score, $r = .59$. The SSRS academic competence score was highly correlated with the Child Behavior Checklist total score, $r = -.59$.

The problem behavior scales of the SSRS Parent Form correlated with the corresponding Child Behavior Checklist scale, $r = .70$. The social skills scales of the SSRS Parent Form correlated with the corresponding Child Behavior Checklist social competence subscale, $r = .58$. The externalizing subscale SSRS Parent Form was correlated with the externalizing scale from the Child Behavior Checklist, $r = .70$. A high correlation between the SSRS hyperactivity subscale and the Child Behavior Checklist externalizing composite was reported, $r = .74$. A correlation of $r = .50$ was reported between the SSRS internalizing subscale and the Child Behavior Checklist internalizing composite.

The SSRS Student Form was compared with the Child Behavior Checklist-Youth Self Report. The correlations between the two instruments were problem behaviors, $r = -.33$, and social competence, $r = .23$. Compared with the Piers-Harris Children's Self-Concept Scale (Piers, 1984), the total scale correlation was $r = .30$.

Acculturation

Data for the acculturation block were derived from the demographic questionnaire completed by the participants' parents (see the Appendix). Parents of the participants completed a demographic questionnaire in the early stages of the research project. Items on the questionnaire were divided into the following nine domains: parent/guardian information, education/employment, household, religion, language, others, and student information. With the exception of the primary caregivers' level of education, all responses were on a ratio scale. The primary caregivers' level of education was on a nominal scale. The questionnaire items that were used for the acculturation block were the number of years the student had resided in the United States, the number of years the students' parent/primary caregiver had resided in the United States, and the parent/primary caregivers' level of education. A complete copy of the demographic questionnaire is presented in the Appendix.

Variables

Independent Variables

Of interest to the current research were the following five primary blocks of independent (predictors) variables: (a) reading achievement, (b) intellectual functioning, (c) language proficiency, (d) behavior, and (e) acculturation. Blocks, sources, and variables are displayed in Table 1.

Dependent Variables

The dependent variables include math computational performance and math reasoning performance as measured by standard scores (M = 100, SD = 15) from the calculation and applied problems subtests of the WJ-III.

Woodcock-Johnson Test of Academic Achievement-Third Edition, Applied Problems Subtest

The applied problems subtest requires the examinee to solve math word problems. This subtest requires examinees to comprehend the nature of a problem, identify relevant information, perform various calculations, and state the solution.

Table 1

Blocks, Sources, and Variables

Predictor blocks	Sources	Component variables
Intellectual functioning	UNIT	Cube design subtest scaled score Symbolic memory subtest scaled score
Language proficiency	IPT oral	English or Spanish
Reading proficiency	WJ-III/Bateria-III	Passage comprehension subtest standard score, letter-word-identification subtest standard score
	CBM passages	Mean of two CBM reading passages, English or Spanish
Behavior	SSRS	Social skills standard scores from parent, teacher, student ratings
Acculturation	Demographic survey	Student length in United States, parent length in United States, caregiver level of education

Note. Bateria-III = Bateria-III Woodcock-Munoz, CBM = curriculum-based measurement, IPT = IDEA Proficiency Test, SSRS = Social Skills Rating System, UNIT = Universal Nonverbal Intelligence Test, and WJ-III = Woodcock-Johnson Test of Academic Achievement-Third Edition.

Many of the items on the subtest are accompanied by a picture or other visual display. Examinees are allowed to use paper and pencil, if necessary.

Data Analysis

All data collected from standardized assessments (i.e., achievement, intellectual functioning, and social skills ratings) used their respective protocols. After each standardized assessment was administered, it was reviewed to ensure that no data were missing from the protocol. For subsequent analyses, the protocols were coded and entered into the current version of the Statistical Package for the Social Sciences, Version 15.0.

Multiple Least Squares Regression

A series of multiple least squares regression models were used to analyze the data. Multiple regression is a statistical analysis that has been frequently employed to evaluate similar data from comparable investigations. Multiple regression is used to examine the correlation between a continuous response (dependent) variable and one or more predictors (independent variables; Berry, 1993). Multiple regression allows researchers to predict one response variable using two or more predictors. A model is developed in which the response variable is a function of the predictors, constants, and an error term. The constants are parameters and the error term is a numeric representation of the unexplained variance in the response variable. The present study examined the correlation between two separate continuous response variables and five blocks of predictors. A predictor block is a group of variables that function as a unit.

Variables in the present study were consistent with those described in Berry.

The most commonly used type of multiple regression is ordinary least squares regression (Berry, 1993). The ordinary least squares regression model is represented as Y = ß X + error, where Y is the actual value of the response variable, ß is a vector of regression coefficients (slope of the regression line), and X is a matrix of predictors.

The model used in an ordinary least squares regression analysis is based on three assumptions: (a) The errors are normally distributed with a mean of 0 and constant variance, (b) the errors are independent, and (c) the independent variables are measured without error (Berry, 1993). Ordinary least squares regression is the most efficient method when the assumptions of the model are satisfied. Ordinary least squares regression produces coefficients that have the minimum variance of all linear unbiased estimators. Predictive accuracy can be adversely affected when the data fail to meet the assumptions of the ordinary least squares regression model, outliers are present, or collinearity exists in the data. The use of multiple least squares regression analyses allows researchers to combine several similar variables into a single predictor and examine the correlation of that predictor to one or more respondent variables.

Multiple variables were combined to formulate each of the individual predictor variables. The predictor variable for intellectual functioning was the FSIQ from the UNIT, which is derived from the cube design and symbolic memory subtests scaled scores. The language proficiency predictor block consisted of scores from the IDEA oral English and IPT oral Spanish. Standard scores from the passage comprehension and letter-word-identification subtests of the WJ-III, the mean of the two standard subtest scores from the WJ-III subtests, the number of words read correctly from the two curriculum-based reading measures, and the mean of those scores constitute the reading achievement predictor block. The social skills predictor block consists of the mean of social skills ratings standard scores from the parent, teacher, and student versions of the SSRS.

The first step in the analyses was to use frequency, descriptive, and correlation analyses to screen for missing values, outliers, and a linear relationship between the predictor and response variables. Additional screening procedures included a visual examination of histograms and scatterplots to identify outliers and inspect the distribution of the variables. When missing values or outliers were detected, further action was taken. If missing values were due to data-entry or other minor human error, when possible, corrections were made by referring back to the raw data and entering the missing values. If missing data were due to the unavailability of the data (i.e., information was not or could not be obtained), the corresponding case was excluded from subsequent analyses.

The data were examined or analyzed to determine if they met the required assumptions for a multiple regression analysis. The first assumption (i.e., errors are normally distributed) can be determined by examining the variance of residuals around the regression line or homoscedasticity. If the variance is constant, then the distribution of errors is determined to be normal and the first assumption is met. One method of evaluating for homoscedasticity is to inspect Q-Q or P-P plots. These plots are an available option when using the proposed statistical analysis software. A visual inspection of the Q-Q or P-P plots will show if the data follow a normal distribution. The data met this assumption.

The second assumption in a multiple regression analysis is that errors are independent. In other words, there is no relationship among the residuals of the data set (Cohen, Cohen, West, & Aiken, 2003). It is generally accepted that this assumption is met in any random sample set from a particular population. An examination of the literature did not result in the discovery of a specific statistical analysis to verify the presence of this assumption. The data in the current study were assumed to have met this assumption.

The final assumption of a multiple regression analysis is that predictor variables are measured without error. In the behavioral sciences, errors in measurement exist in varying degrees (Cohen et al., 2003). In some variables, the degree of error is relatively minor, whereas in others it is comparatively greater. When there is no error, $r_{xx} = 1.0$. If measurement error is present, then $r_{xx} < 1.0$. Reliability of the measure is generally acceptable if r is greater than .70. Analyses of the current study showed this assumption was met.

To evaluate for collinearity between predictor variables, correlational analyses were conducted. Highly correlated predictor variables, $r > .90$, were further examined to determine which predictor variable demonstrated the greatest degree of correlation with, and explained more of, the variance in the response variable. The variables accounting for the greatest level of variance were used in subsequent analyses. The regression analyses were conducted and identified which variables were the strongest predictors of the response variables (standard scores from the WJ-III applied problems and calculation subtests) and then identified which variable within each predictor was the strongest predictor of the response variables. The one-variable models were in the form $E(y) = \beta_0 + \beta_1 x_i$, where x_i is the ith independent variable, with $i = 1, 2, \ldots, k$. For each test, the null hypothesis is H_0: $\beta_1 = 0$. An analysis of variance was used to conduct a test of significance. The predictor variable generating the greatest R^2 value was determined to be the best single-variable predictor.

For each response variable, the proportion of variance attributable to each block of predictor variables was calculated independently and incrementally. A regression analysis is a commonly used procedure to identify the significance and direction of the relationship when there are large numbers of variables available (McClave & Sincich, 2000). This procedure identified which block and the variables within each block that were the strongest predictor of the response variables.

As it applied to the current study, regression analyses were conducted in two phases. In each phase, a multiple least squares regression analyses was used to evaluate the relationship between the predictor and response variables. The purpose of the multiple least squares regression analyses in the first phase was to determine the level of independent variance in each response variable explained by each block of predictor variables.

Initially, separate analyses compared the five individual blocks of predictors with the response variables independently. Only one block (predictor) was included during this set of analyses. The remaining four blocks (predictors) were excluded. For example, the variables in the intellectual functioning block (i.e., FSIQ, symbolic memory, and cube design) were independently compared with applied problems. These variables were the only variables in that particular analysis. The same process was repeated for all five blocks of predictor variables. These analyses resulted in the determination of the level of independent variance for each block of predictors. In addition, one regression analysis included all variables from all predictors. This analysis determined the amount of independent variance for each response variable.

In the second phase of the analysis, the amount of incremental variance in the response variables attributable to each block of predictors was determined. The incremental variance is the unique amount of variance explained by one predictor block after controlling for the other predictor blocks. This was accomplished by entering the predictor blocks separately into one of two steps. For example, to determine the incremental variance of applied problems attributable to the intellectual functioning block, FSIQ, symbolic memory, and cube design were entered on the second step. All other blocks were entered on the first step, and applied problems was entered as the dependent variable.

CHAPTER 3

RESULTS

Overview of the Analyses

The purpose of this study was to examine specific variables that predict the levels of math computation and math reasoning performance of Latino elementary school students. The predictor (independent) variables incorporated into the present study were grouped into the following conceptual blocks: (a) intellectual functioning, (b) language proficiency, (c) reading proficiency, (d) academic behavior ratings, and (e) acculturation. In addition to descriptive statistics, two sets of multiple regression analyses were used to identify those variables or a combination of variables that predict math performance levels. The response (dependent) variables were standard scores from the WJ-III calculation and applied problems subtests. Data were analyzed using command sets from the Statistical Package for the Social Sciences, Version 15.0.

Data Screening

Data were initially screened for consistency and accuracy by examining the means, standard deviations, and ranges of the variables. For files missing specific variables, a review of the raw data was conducted to determine if the missing data were the result of data-entry errors or due to incomplete data collection. If the missing data were due to data-entry errors, those errors were corrected. If the omission was the result of incomplete data collection, the respective case was excluded from further analyses. One of the undesirable effects of deleting cases is a loss of power. Initially, 93 cases were in the original data set. Due to incomplete data, the final analyses included 87 participants. The effect on statistical power resulting from excluding 6 participants in the final analyses was determined to be negligible.

Descriptive Statistics

Eighty-seven participants were included in the final analyses. All 87 participants were Latino students enrolled in Grades 4, 5, and 6 in the same urban elementary school. Data with regard to their prior educational experience and exposure to math curriculum were not available. The cohort consisted of 35 females (40.2%) and 52 males (59.8%), with an approximate average age of 10 years (M = 10.37, SD = .97). Thirty-five participants (40.2%) were enrolled in fourth grade, 29 (33.3%) in fifth grade, and 23 (26.4%) in sixth grade. Most participants (n = 50, 57.5%) reported the United States as their country of birth. Another 34 participants (39.1%) reported being born in Mexico. One participant (1.1%) reported being born in Peru, 1 participant (1.1%) born in Cuba, and 1 participant (1.1%) born in Costa Rica. The average length of U.S. residency for the participants was nearly 8 years (M = 7.82, SD = 3.45). The birthplaces of the participants' mothers were United States (n = 75, 86.2%), Mexico (n = 6, 6.9%), and other countries (n = 6, 6.9%). The average length of residency for the participants' primary caregiver was slightly more than 12 years (M = 12.2, SD = 8.3). The country of birth for the participants' fathers was Mexico (n = 59, 65.6%), not reported (n = 26, 28.9%), and other countries (n = 4, 5.5%). The vast majority (n = 62, 71.3%) of the participants' fathers reported their race as Latino. Some fathers (n = 26, 28.9%) did not report a racial identity. Other fathers (n = 2, 2.3%) reported their race as Pacific Islander. The level of education for the participants' primary caregiver was approximately 3 years (M = 3.03, SD = 1.64). Descriptive statistics for gender, age, grade level, students' country of birth, students' length of U.S. residency, length of primary caregivers' U.S. residency, and primary caregivers' level of education are summarized in Table 2.

Data from the 87 participants included in the analyses were scores and standard deviations from the UNIT; WJ-III calculation, applied problems, letter-word-identification, and passage comprehension subtests; and SSRS from parent, teacher, and student ratings. Means, standard deviations, ranges, and kurtosis statistics are presented in Table 3.

An examination of the factors of the predictor variables revealed a normal distribution. The results reported above show means and standard deviations that are consistent with the results of the normative samples used in the standardization of the respective assessments. A visual inspection of Q-Q plots also revealed an equal variance of residuals for each of the predicted values of each variable. Therefore, it was concluded that the assumption of homoscedasticity necessary for a multiple regression analysis was satisfied.

Table 2

Frequencies and Percentages for Participants' Gender, Age, Grade, Country of Birth, Length of U.S. Residency; Primary Caregivers' Length of U.S. Residency and Level of Education

Variable	Frequency	Percentage
Gender		
Male	52	59.8
Female	35	40.2
Age		
9 years	18	20.7
10 years	31	35.6
11 years	26	29.9
12 years	12	13.8
Grade		
4th	35	40.2
5th	29	33.3
6th	23	26.4
Country of students' birth		
United States	50	57.5
Mexico	34	39.1
Cuba	1	1.1
Costa Rica	1	1.1
Peru	1	1.1
Students' length of U.S. residency		
1 year	2	2.3
2 years	7	8.0
3 years	2	2.3
4 years	8	9.2
5 years	4	4.6

Table 2 (*continued*)

Variable	Frequency	Percentage
6 years	4	4.6
7 years	2	2.3
9 years	16	18.4
10 years	18	20.7
11 years	19	21.8
12 years	3	3.4
Length of primary caregivers' U.S. residency		
< 1 year	1	1.2
2 years	7	8.1
3 years	2	2.4
4 years	8	9.2
5 years	3	3.4
6 years	5	5.7
7 years	2	2.4
8 years	2	2.4
9 years	5	5.7
10 years	2	2.4
11 years	4	4.6
12 years	8	9.2
13 years	3	3.4
14 years	9	10.3
15 years	9	10.3
17 years	2	2.4
18 years	2	2.4
19 years	1	1.2
20 years	2	2.4

Table 2 (*continued*)

Variable	Frequency	Percentage
22 years	1	1.2
24 years	1	1.2
25 years	2	2.4
32 years	2	2.4
33 years	1	1.2
34 years	2	2.4
39 years	1	1.2
Primary caregivers' level of education		
6 or less	24	27.6
7 to 8	9	10.3
Some high school/no diploma	17	19.5
High school diploma/general equivalency diploma	23	26.4
Some college, no diploma	6	6.9
Associate's degree	7	8.0
Bachelor's degree	1	1.2

Note. N = 87.

Table 3

Means, Standard Deviations, Ranges, Kurtosis Predictors, and Response Variables

Measure	Mean	*SD*	Minimum	Maximum	Kurtosis	Skew
UNIT FSIQ	100.29	13.54	63	132	-.102	-.217
Calculation	96.94	14.43	64	122	-.159	-.178
Applied problems	98.08	11.10	66	121	-.011	-.236
Letter-word-identification	92.94	13.41	64	140	.869	-.020
Passage comprehension	85.48	10.75	60	113	-.247	.158
CBM English	96.22	36.08	12	176	-.768	-.108
CBM Spanish	41.87	31.88	3	160	1.332	1.108
Social skills ratings, parent	107.70	15.91	71	130	-.574	-.314
Social skills ratings, teacher	101.47	15.27	73	130	-1.092	.242
Social skills ratings, student	108.32	14.13	74	130	-.427	-.389
IPT oral English	5.21	1.41	2	6	.861	-1.557
IPT oral Spanish	5.09	1.33	1	6	1.899	-1.581
Length of students' U.S. residency	7.87	3.35	1	12	-.862	-.763

Table 3 (*continued*)

Measure	Mean	*SD*	Minimum	Maximum	Kurtosis	Skew
Length of primary caregivers' U.S. residency	12.19	8.29	0	39	1.431	1.154

Note. UNIT = Universal Nonverbal Intelligence Test, FSIQ = Full Scale IQ, CBM = curriculum-based measurement, and IPT = IDEA Proficiency Test. N = 87.

To evaluate for collinearity between predictor variables, correlational analyses were conducted. Highly correlated factors of predictor variables, $r > .90$, were further examined to determine which factor of the predictor variable demonstrated the greatest degree of correlation with and explained more of the variance in the response variable. The variables accounting for the greatest level of variance were used in subsequent analyses. The results of the correlational analyses of predictor and response variables are presented in Table 4.

The results show that although there were a number of statistically significant correlations, none was greater than .90. This means that collinearity between predictor variables was not detected.

Regression Analyses

Initially, regression analyses were conducted to determine the amount of variance independently attributable to each block of predictor variables. The results of the analyses determined the correlation between each block of predictor variables and each of the response variables. For each of these analyses, one predictor block (e.g., intellectual functioning) was entered as the independent variable and one response variable (e.g., calculation) was entered as the dependent variable. Following those analyses, two sets of five regression analyses were conducted to determine the added or incremental variance in the two response variables (i.e., applied problems and calculation) attributable to each of the five blocks of the predictor variables (i.e., intellectual functioning, reading proficiency, language proficiency, behavior, and acculturation). Each analysis in the second set determined the additional variance

Table 4

Correlation Matrix Among Predictor and Response Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PVs																
1	1.000															
2	.791*	1.000														
3	.822**	.308	1.000													
4	.056	-.109	.177	1.000												
5	.195	.046	.251*	.544**	1.000											
6	.197	.071	.222*	.727**	.604*	1.000										
7	.368**	.252*	.388	.481**	.680*	.741**	1.000									
8	.045	-.023	.105	.446**	.084	.165	.069	1.000								
9	.138	.080	.152	-.344**	.241*	-1.940	.096	.027	1.000							
10	.013	-.047	.086	.209	.019	.153	.128	.325**	-.150	1.000						
11	.237*	.173	.214*	.231*	.457**	.277*	.415**	.079	.049	.104	1.000					
12	.081	.077	.058	.013	.072	.112	.059	.142	.068	.439**	.256*	1.000				
13	.083	.034	.107	-.426	.180	-.236	.002	-.181	.591**	-.321**	.102	.041	1.000			
14	.068	.064	.051	-.370	.186	-.071	.104	-.544**	.267*	-.315**	.160	-.031	.595**	1.000		
15	.007	-.046	.049	.122	.251*	.141	.109	-.092	.148**	.018	-.023	.044	-.006	.068	1.000	
RVs																
16	.360**	.217*	.364*	.460**	.595**	.266*	.540**	-.059	.384**	.093	.205	-.107	.232*	.137	.155	1.000
17	.426**	.244*	.446**	.305	.513**	.441**	.678**	.039	.279**	.040	.301**	.034	.138	.096	.234	.662**

Table 4 (*continued*)

Note. PVs = predictor variables (1 = IQ, 2 = SM, 3 = CD, 4 = CBMS, 5 = CBME, 6 = LWID, 7 = PassC, 8 = IPT-S, 9 = IPT-E, 10 = SS-P, 11 = SS-T, 12 = SS-S, 13 = L St, 14 = L Par, 15 = LvEd); RVs = response variables (16 = ApPb and 17 = Cal); IQ = UNIT FSIQ standard score; symbolic memory = UNIT symbolic memory subtest scaled score; cube design = UNIT cube design subtest scaled score; CBMS = mean number of words read correctly from two curriculum-based measures written in Spanish; CBME = mean number of words read correctly from two curriculum-based measures written in English; letter-word-identification = WJ-III letter-word-identification subtest standard score; PassC = WJ-III passage comprehension subtest standard score; IPT-S = IPT oral Spanish standard score; IPT-E = IPT oral English standard score; SS-P = SSRS-Parent social skills standard score; SS-T = SSRS-Teacher social skills standard score; SS-S = SSRS-Student social skills standard score; L St = students' length of U.S. residency; L Par = primary caregivers' length of U.S. residency; LvEd = primary caregivers' level of education; ApPb = WJ-III applied problems subtest standard score; and Cal = WJ-III calculation subtest standard score.

*Statistically significant, $p < .05$ two-tailed.

**Statistically significant, $p < .01$ two-tailed.

attributable to a specific predictor block (e.g., intellectual functioning) when controlling for the variance attributable to the four remaining blocks (e.g., reading proficiency, language proficiency, behavior, and acculturation) for each response variable, applied problems, and calculation.

After the initial regression analyses were performed, a second step of the analyses was conducted. Using procedures identical to those described above, analyses were conducted to determine the independent and incremental variability attributable to each variable within each predictor block. For this set of analyses, independent variance was determined for each variable reported (e.g., FSIQ) within each predictor block (e.g., intellectual functioning). To determine incremental variance, only the remaining variables within the block (e.g., cube design and symbolic memory) were used.

Research Question 1

Which factors, intellectual functioning, language proficiency, reading proficiency, behavior, acculturation, or a combination of factors, most accurately predict the level of math computational performance of Latino elementary school students? To answer Research Question 1, two sets of regression analyses were conducted. The first set of analyses evaluated the independent relationships between the five blocks of predictor variables and the standard score on the WJ-III calculation subtest. For the independent level analyses, only the variables constituting one predictor block were analyzed. For example, the FSIQ, symbolic memory, and cube design were included as the only independent variables. All other variables were excluded. The results from this analysis explained the amount of variance in calculation, the response variable that is attributable to intellectual functioning, and one of the predictor blocks. Four additional regression analyses were conducted in similar fashion. In each analysis, the predictor blocks, reading proficiency, language proficiency, behavior, and acculturation were compared separately with calculation. The amount of independent and incremental variance in calculation attributable to the individual blocks of predictor variables is presented in Table 5.

The amount of independent variance in calculation attributable to reading proficiency and intellectual functioning was statistically significant. Reading proficiency explained a greater level of the independent variance than was explained

Table 5

Independent and Incremental Variance, F, and Significance of Predictor Variables With Calculation

Block	Variance type	R^2	F	p
Intellectual functioning	Independent	.215	7.568	.000
	Incremental	.044	2.544	.063
Reading proficiency	Independent	.477	18.674	.000
	Incremental	.246	10.637	.000
Language proficiency	Independent	.079	3.582	.032
	Incremental	.022	1.867	.162
Behavior	Independent	.093	2.848	.042
	Incremental	.001	0.051	.985
Acculturation	Independent	.074	2.213	.093
	Incremental	.020	1.125	.345
Total		.589	6.779	.000

by intellectual functioning. At the incremental level, however, only the variance attributable to reading proficiency was statistically significant. The total amount of variance in calculation explained by all five predictor variables as a group was statistically significant. The independent and incremental variance explained by language proficiency, behavior, and acculturation was statistically nonsignificant.

A second set of analyses evaluated the independent and incremental relationship of the variables within each block of the predictor variables and the standard score on the calculation subtest. Details of the results, including independent and incremental variances, *F* values, and significance, are presented in Tables 6, 7, 8, 9, and 10.

Table 6

Independent and Incremental Variance, F, and Significance of Intellectual Variables With Calculation

Variable	Variance type	R^2	F	p
UNIT FSIQ	Independent	.182	18.856	.000
	Incremental	.003	.326	.570
Symbolic memory	Independent	.060	5.385	.023
	Incremental	.005	.508	.478
Cube design	Independent	.199	21.132	.000
	Incremental	.010	1.083	.301
Total		.215	7.568	.000

Note. UNIT = Universal Nonverbal Intelligence Test and FSIQ = Full Scale IQ.

Table 7

Independent and Incremental Variance, F, and Significance of Reading Proficiency Variables With Calculation

Variable	Variance type	R^2	F	p
Letter-word-identification	Independent	.194	20.503	.000
	Incremental	.010	1.542	.218
Passage comprehension	Independent	.459	72.127	.000
	Incremental	.181	28.369	.000
Mean number of words read correctly from CBM English	Independent	.264	30.433	.000
	Incremental	.007	1.161	.284
Mean number of words read correctly from CBM Spanish	Independent	.093	8.722	.004
	Incremental	.001	.058	.811
Total		.477	18.674	.000

Note. CBM = curriculum-based measurement.

Table 8

Independent and Incremental Variance, F, and Significance of Language Proficiency Variables With Calculation

Variable	Variance type	R^2	F	p
IPT oral English	Independent	.078	7.151	.009
	Incremental	.077	7.026	.010
IPT oral Spanish	Independent	.002	.129	.721
	Incremental	.001	.090	.765
Total		.079	3.582	.032

Note. IPT = IDEA Proficiency Test.

Table 9

Independent and Incremental Variance, F, and Significance of Behavior Variables With Calculation

Variable	Variance type	R^2	F	p
Standard score social skills, parent	Independent	.002	.136	.714
	Incremental	.001	.087	.769
Standard score social skills, teacher	Independent	.090	8.449	.005
	Incremental	.091	8.366	.005
Standard score social skills, student	Independent	.001	.100	.753
	Incremental	.003	.260	.612
Total		.093	2.848	.042

Table 10

Independent and Incremental Variance, F, and Significance of Acculturation Variables With Calculation

Variable	Variance type	R^2	F	p
Length of students' U.S. residency	Independent	.019	1.648	.203
	Incremental	.013	1.163	.284
Length of primary caregivers' U.S. residency	Independent	.009	.791	.376
	Incremental	.000	.001	.973
Primary caregivers' education	Independent	.055	4.913	.029
	Incremental	.055	4.908	.029
Total		.074	2.213	.093

Research Question 2

Which factors, intellectual functioning, language proficiency, reading proficiency, behavior, acculturation, or a combination of factors, most accurately predict the level of math reasoning performance of Latino elementary school students? The same analytical procedures used to answer Research Question 1 were also used to answer Research Question 2 with the dependent variable changed from calculation to applied problems. Again, two sets of regression analyses were conducted. The first set of analyses evaluated the independent and incremental relationships between the five blocks of predictor variables and the applied problems subtest standard score. The amount of independent and incremental variance attributable to the individual blocks is presented in Table 11.

The amount of independent variance in applied problems attributable to reading proficiency, behavior, and intellectual functioning was statistically significant. In order of the magnitude of the amount of variance explained, reading proficiency accounted for the greatest amount. Behavior explained the next largest amount and intellectual functioning contributed the least amount of statistically significant variance in applied problems. At the incremental level, only reading proficiency and language proficiency explained a significant amount of additional variance. The amount of variance explained by all five predictor variables as a group

Table 11

Independent and Incremental Variance, F, and Significance of Predictor Variables With Applied Problems

Block	Variance type	R^2	F	p
Intellectual functioning	Independent	.145	4.680	.005
	Incremental	.030	1.579	.202
Reading proficiency	Independent	.399	13.586	.000
	Incremental	.217	8.437	.000
Language proficiency	Independent	.055	2.439	.093
	Incremental	.059	4.548	.014
Behavior	Independent	.159	5.226	.002
	Incremental	.022	1.125	.345
Acculturation	Independent	.079	2.368	.077
	Incremental	.050	2.568	.061
Total		.543	5.627	.000

was statistically significant. The independent and incremental variance attributable to acculturation was nonsignificant.

The second set of analyses evaluated the independent and incremental relationship of the variables within each block of the predictor variables and the standard score on the applied problems subtest. Details of the results, including independent and incremental variances, *F* values, and significance, are presented in Tables 12, 13, 14, 15, and 16.

Table 12

Independent and Incremental Variance, F, and Significance of Intellectual Variables With Applied Problems

Variable	Variance type	R^2	F	p
UNIT FSIQ	Independent	.129	12.643	.001
	Incremental	.001	.027	.870
Symbolic memory	Independent	.047	4.182	.044
	Incremental	.001	.091	.764
Cube design	Independent	.132	12.960	.001
	Incremental	.003	.278	.600
Total		.145	4.680	.005

Note. UNIT = Universal Nonverbal Intelligence Test and FSIQ = Full Scale IQ.

Table 13

Independent and Incremental Variance, F, and Significance of Language Proficiency Variables With Applied Problems

Variable	Variance type	R^2	F	p
IPT oral English	Independent	.042	3.740	.056
	Incremental	.043	3.855	.053
IPT oral Spanish	Independent	.011	.989	.323
	Incremental	.013	1.131	.291
Total		.055	2.439	.093

Note. IPT = IDEA Proficiency Test.

Table 14

Independent and Incremental Variance, F, and Significance of Reading Proficiency Variables With Applied Problems

Variable	Variance type	R^2	F	p
Letter-word-identification	Independent	.165	16.792	.000
	Incremental	.002	.332	.566
Passage comprehension	Independent	.353	46.464	.000
	Incremental	.085	11.596	.001
Mean number of words read correctly from CBM English	Independent	.292	35.023	.000
	Incremental	.042	5.777	.018
Mean number of words read correctly from CBM Spanish	Independent	.071	6.448	.013
	Incremental	.002	.251	.618
Total		.399	13.586	.000

Note. CBM = curriculum-based measurement.

Table 15

Independent and Incremental Variance, F, and Significance of Behavior Variables With Applied Problems

Variable	Variance type	R^2	F	p
Standard score social skills, parent	Independent	.003	.294	.589
	Incremental	.011	1.129	.291
Standard score social skills, teacher	Independent	.147	14.697	.000
	Incremental	.138	13.621	.005
Standard score social skills, student	Independent	.009	.737	.393
	Incremental	.002	.163	.687
Total		.159	5.226	.002

Table 16

Independent and Incremental Variance, F, and Significance of Acculturation Variables With Applied Problems

Variable	Variance type	R^2	F	p
Length of students' U.S. residency	Independent	.054	4.856	.030
	Incremental	.039	3.475	.066
Length of primary caregivers' U.S. residency	Independent	.019	1.635	.205
	Incremental	.000	.021	.885
Primary caregivers' education	Independent	.024	2.101	.151
	Incremental	.025	2.235	.139
Total		.079	2.368	.077

CHAPTER 4

DISCUSSION

The purpose of the present study was to evaluate five blocks of predictors in order to determine which block or combination of blocks most accurately predicts the math computation and math reasoning performance levels of Latino elementary school students. The data were obtained from a cohort of 87 Latino students enrolled in an elementary school in a western state. Predictors examined in the current study included intellectual functioning, reading proficiency, language proficiency, behavior, and acculturation. Each block was comprised of two or more variables. The intellectual functioning block consisted of the FSIQ, symbolic memory, and cube design scores from the UNIT. The reading proficiency block was comprised of the mean of two curriculum-based reading measures written in Spanish, the mean of two curriculum-based reading measures written in English, and the standard scores from the letter-word-identification and passage comprehension subtests from the WJ-III. The standard scores from the IPT oral Spanish and IPT oral English were the two variables that made up the language proficiency block. The acculturation block was composed of the length (in years) of the students' U.S. residency, the length (in years) of the primary caregivers' U.S. residency, and the primary caregivers' level of education. The two response variables were the standard scores from the calculation and applied problems subtests of the WJ-III.

Major Findings

The results of the current study extend the findings of previous research that examined variables predicting math performance (Berry, 1998; Eccles & Harold, 1993; Floyd et al., 2003; Fuchs et al., 2005; Gresham et al., 1987; Hess & D'Amato, 1996; Ibanez et al., 2004; Jitendra et al., 2007; Lopez et al., 2007; Proctor et al., 2005; Stevenson & Baker, 1987; Swanson & Beebe-Frankenberger, 2004; Taub et al., 2008; Taylor & Nixon 1996; Teisl et al., 2001). However, none of the earlier studies specifically focused on the performance of Latino students. Therefore, the present study extended prior research by using similar variables and statistical procedures to predict levels of math computation and math reasoning performance levels of Latino elementary school students. The inclusion of Latino students in prior research was typically only in proportion to the prevailing U.S. Census Bureau demographics. The present study examined similar variables in a cohort of Latino students exclusively.

Previous studies generally used a verbally loaded instrument to measure intellectual functioning. Although this is a generally accepted procedure, it may adversely affect the validity of the results by underestimating the ability of individuals with language proficiency deficits. The current study utilized a nonverbal instrument to determine intellectual functioning and assessed language proficiency as a separate variable. This procedure differs from previous investigations. By isolating language proficiency, examining it as a variable separate from intellectual functioning, and using a nonverbal instrument to measure intellectual functioning, the present study extended the work of previous researchers.

Intellectual Functioning

Previous studies found that intellectual functioning was the strongest predictor of math performance (Floyd et al., 2003; Proctor et al., 2005). The results of the present study are consistent but not identical with previous results. The analyses from the present study also show that intellectual functioning is a significant predictor of the math performance of Latino students as measured by the calculation and applied problems subtests of the WJ-III. However, intellectual functioning was not the strongest predictor, as had been the conclusion reported in prior research (Floyd et al.). The results of the current study show that reading proficiency was comparatively stronger. This finding is divergent from what has been previously reported.

An explanation for the difference in results can be attributed to previous studies failing to include measures of reading proficiency and intellectual functioning in the same study and the use of verbally loaded measures of intellectual functioning. The present study's use of the UNIT eliminated the potential confounds attributable to miscommunication and addressed the desire expressed by the educational community for the use of less culturally biased assessments.

Another difference between the results of the current study and previous work is the overall measure of intellectual functioning; FSIQ was not the strongest predictor within the intellectual functioning block. Although not incrementally significant itself, the cube design subtest was a stronger predictor of both applied problems and calculation relative to the nonsignificant incremental strength of the UNIT FSIQ.

Although the cube design contributes to the measure of general intellectual functioning, it was not developed to be a singular measure. The UNIT FSIQ was derived from two subtest scaled scores. The conclusions of previous research reported that general intelligence may be the only construct that needs to be measured (Glutting et al., 2006). These authors also reported that the verbal comprehension index demonstrated a significant influence on math achievement and included only Latino students as one portion of their cohort demographic, not conducting a separate analysis with this group. The results of the current study contradict the assertion that general intelligence is the only construct that needs to be measured. The results also suggest that a more comprehensive assessment may be needed to accurately identify deficiencies that contribute to math performance deficits.

Reading Proficiency

Previous research has concluded that reading is a significant predictor of math performance (Fuchs et al., 2005; Jitendra et al., 2007; Swanson & Beebe-Frankenberger, 2004; Teisl et al., 2001). The results reported by Swanson and Beebe-Frankenberger stated that reading skills are necessary to solve math reasoning problems. Others have reported that students with reading difficulties are likely to experience math difficulties (Jitendra et al.). According to Teisl et al., subtests of the WJ-III, including letter-word-identification, showed independent and incremental strength relative to the applied problems subtest. The current study also supports those findings as well as showed reading proficiency subtests of the WJ-III are predictive of math performance.

The results show that higher scores on all measures of reading used in the current study, including letter-word-identification, are highly correlated with applied problems. The results further show that all measures of reading except curriculum-based reading measures written in Spanish are highly correlated with calculation. This finding confirms that reading ability is predictive of math performance levels. It also demonstrates that students with higher levels of reading proficiency are more likely to have higher levels of math performance.

Language Proficiency

According to Lopez et al. (2007), scores generated from the IPT are predictive of Latino math performance. The current study supports that conclusion and extends the literature to specific areas of math performance. Specifically, English language proficiency is strongly correlated with both measures of math performance used in the current study. The correlation of English language with math reasoning (applied problems) is comparatively stronger than the correlation with calculation. These results imply that students with more developed English language proficiency are more likely to experience higher levels of performance on math reasoning problems than when completing calculation problems. It is important to note that the difference between the two correlations was not analyzed. The current study also shows that English language proficiency is strongly correlated with curriculum-based reading measures written in English. The results suggest that an increased ability to understand English is beneficial when attempting to solve word problems.

Behavior

Behavior has been identified as a predictor of math performance (DiPerna et al., 2007; Gresham et al., 1987; Taylor & Nixon, 1996; Teisl et al., 2001). Earlier studies reported that social skills and behavior ratings were correlated with math performance (Gresham et al., 1997). Other researchers have also reported attention, one of the variables measured by the SSRS, was predictive of math performance (Fuchs et al., 2005). The results of the current study support those conclusions and extend the literature to include Latino students.

Collectively, parent, teacher, and student ratings of the students' social skills are a significant independent predictor of math computation and math reasoning performance. Compared with parent and student ratings, teacher ratings of behavior are the strongest math calculation and math reasoning performance predictor both independently and incrementally.

A more detailed discussion of the findings from the current study in relationship to the research questions, hypotheses, and research literature are given in the following sections. Limitations, implications for future research, and implications for practice are also discussed.

Answers to Research Questions

Research Question 1

Which factors, intellectual functioning, language proficiency, reading proficiency, behavior, acculturation, or a combination of factors, most accurately predict the level of math computational performance of Latino elementary school students? Collectively, the variables examined in the current study accurately predict the level of math computation performance of Latino elementary school students. When combined, the blocks included in the current study account for nearly 60% of the variance in the standard scores of the WJ-III calculation subtest.

Individually, reading proficiency, intellectual functioning, language proficiency, and behavior are all significant predictors of math calculation independently. Reading proficiency is the only block that was significant both independently and incrementally. Acculturation is not a significant predictor of calculation. Reading proficiency accounts for more of the independent and incremental variance than any of the other blocks. Intellectual functioning accounts for the next largest portion of independent variance. Behavior is a significant predictor and accounts for the smallest portion of the independent variance compared with other blocks shown to be significant.

Compared with other blocks, reading proficiency most accurately predicts the level of math computation performance of Latino elementary school students. The degree of accuracy with which reading proficiency predicts the math computation performance is shown by the portion of both the independent and incremental variance attributable to this predictor. By itself (as indicated by the independent variance), reading proficiency accounts for a greater portion of the variance in math computation performance. In conjunction with other blocks used in the current study (i.e., incremental variance), reading proficiency explains more additional variance than any of the other blocks.

Intellectual functioning. Within the intellectual functioning block, the three predictors are highly correlated. Despite the correlational levels, cube design accounts for more independent and incremental variance than either the symbolic memory subtest or the overall measure of intellectual functioning, FSIQ. The amount of variance attributable to cube design is significant independently but not significant incrementally. The UNIT FSIQ accounts for more independent and incremental variance than the symbolic memory subtest but less than what is accounted for by the cube design subtest within the intellectual functioning block. The variance attributable to FSIQ is significant independently but not incrementally. The amount of variance accounted for by the predictor, the symbolic memory subtest, is significant independently but not incrementally. It is also less predictive of math computation than either the cube design or the FSIQ.

These results show that despite the overlap between the cube design subtest and the FSIQ, the cube design subtest is more strongly related to math calculation than the symbol search subtest or the overall measure of intellectual functioning, FSIQ. The implications of these results mean that Latino students who score higher on the cube design subtest have an increased probability of experiencing greater success with tasks either academic or for daily living that require math computational skills.

Language proficiency. The amount of variance in the standard score on the WJ-III calculation subtest attributable to the language proficiency block is statistically and significantly independent. The variance explained by language proficiency is not significant incrementally. The amount of independent and incremental variance in calculation attributable to the IPT oral English variable is also statistically significant. The amount of independent and incremental variance in calculation attributable to the IPT oral Spanish is not statistically significant.

These results show that oral English language proficiency is a significant predictor of math calculation performance. The results do not show that English language proficiency causes math calculation deficiencies, only that a correlation between the variables exists. This finding means that students with more well-developed English language proficiency are less likely to experience difficulties with math calculation problems than students who have less-developed language skills. Given the results of the current research, teachers may want to monitor the math calculation performance of students with underdeveloped English language skills.

Reading proficiency. The amount of variance in the calculation subtest attributable to the reading proficiency block is statistically significant. The independent variance attributable to each of the variables in the reading proficiency block (i.e., letter-word-identification, passage comprehension, mean number of words read correctly from CBM English passages one and two, and mean number of words read correctly from CBM Spanish passages one and two) is also statistically significant. Incrementally, the variance attributable to passage comprehension is statistically significant. The incremental variance attributable to the other variables in this block is not statistically significant. This finding means, as a block, that reading proficiency is a significant predictor of math calculation. These findings have important implications.

These implications include the following: Reading skills have a significant influence on math calculation performance. The results suggest that students with well-developed reading skills are more likely to be successful solving math problems where calculation is included. Conversely, students with underdeveloped reading skills are more likely to encounter difficulties with math calculation. Further, if Latino students show signs of difficulty with reading, which may be the first academic area where deficiencies are noticed, teachers and other educational professionals may, based on the results of the current research, assume the student is at risk for having difficulties in math calculation. Implementing an appropriate monitoring program or increasing the frequency of assessment could be a prudent preventive or precautionary procedure. It is important to note that while there is a correlation between reading proficiency and math calculation performance, the current research does not establish a causal relationship between the two variables.

Behavior. The results show that the variance in calculation attributable to the behavior block is statistically significant. The magnitude of the contribution of the behavior block is only stronger than acculturation. The amount of independent and incremental variance in calculation attributable to the social skills standard score from the SSRS, Teacher Form is statistically significant. Scores from the teacher version of the SSRS are more predictive independently and incrementally than other variables within the behavior block. Scores from the parent version of the SSRS are more strongly predictive of calculation independently than scores from the student version.

Scores from the student version of the SSRS are stronger predictors incrementally than scores from the parent version. The independent and incremental variances accounted for by scores from the parent and student versions of the SSRS are not statistically significant.

The results show that social skills standard scores from the SSRS completed by the teachers are significantly predictive of students' math calculation performance scores. This finding means that students with more social skills (as rated by their teachers) generally have higher math computation scores, and students with fewer social skills generally have lower math calculation scores. These results also mean that students with less-developed social skills could reasonably be identified as having the potential for math calculation deficiencies. However, this does not mean that underdeveloped social skills cause math calculation difficulties, only that a correlation between the two variables exists.

Acculturation. The acculturation block accounts for the least amount of variance in math calculation both independently and incrementally. Within the acculturation block, the primary caregivers' level of education is the only variable that is significantly predictive both independently and incrementally. That variable also accounts for the greatest amount of variance. The students' length of U.S. residency is a stronger variable both independently and incrementally relative to the length of the primary caregivers' U.S. residency but accounts for less variance than the primary caregivers' level of education.

This finding means that Latino students whose primary caregiver has a higher level of education are more likely to have a higher math calculation score. This finding also means that Latino students whose primary caregiver has less education are less likely to have a high degree of success with math computation. Schools can utilize the results of the current research to develop schoolwide monitoring or other proactive strategies to identify students with potential math computation difficulties and to implement preventive programs.

Summary. The blocks included in the current study accurately predict the math calculation performance of Latino elementary school students. When combined, the blocks account for a statistically significant portion of the variance in the standard scores of the WJ-III calculation subtest. As individual blocks, only intellectual functioning, reading proficiency, and language proficiency are significant predictor variables of math computation performance. Only reading proficiency is statistically significant incrementally. Reading proficiency is the only block that accounts for a statistically significant amount of additional variance when the variance from the other blocks is held constant.

The results of the current study do not support the hypothesis that intellectual functioning would be the most accurate predictor of the math computation performance of Latino elementary school students. Reading proficiency accounts for more of the variance of calculation independently and incrementally than intellectual functioning. My primary hypothesis was predicated on the findings of Glutting et al. (2006) and Taub et al. (2008). The results of previous research stated that intellectual functioning is strongly correlated with math performance and may be the only construct that needs to be measured. The previous research includes Latino students as a portion of the cohort without analyzing their performance repeatedly, fails to address language proficiency, and uses verbally loaded instruments to measure intellectual functioning. Previous research also fails to address other variables included in the present study.

In contrast to the results of previous research, the current study shows that reading proficiency accounts for more variance of the level of performance on the WJ-III calculation subtest independently and incrementally than any of the other blocks. This finding may be partially attributable to the greater number of reading proficiency variables used in the current study and the overlap between them. Four variables were within the reading proficiency block. These variables included the standard scores from two of the WJ-III subtests: (a) passage comprehension and (b) letter-word-identification. Four CBM passages were also included: (a) two in Spanish and (b) two in English. A mean score of words read correctly in both Spanish and English was calculated and used as the other two reading proficiency variables. In comparison, intellectual functioning was comprised of three variables: (a) FSIQ, (b) cube design, and (c) symbolic memory. The remaining blocks, behavior and acculturation, had only three variables as well.

Within the reading proficiency block passage, comprehension accounted for the greatest amount of variance. The mean number of words read correctly from CBM English passages one and two account for the next largest amount of variance followed by letter-word-identification.

Intellectual functioning is a significant predictor of calculation independently. It is not significant incrementally. Within the intellectual functioning block, cube design, not FSIQ, account for more of the variance independently and incrementally, failing to confirm the findings of Glutting et al. (2006) and Taub et al. (2008) when generalizing to a cohort of Latino students. This finding means that the cognitive abilities used to complete the tasks of the cube design subtest, assembling two- or three-dimensional designs based on a visual model, are more predictive of math calculation performance than overall intellectual functioning.

Language proficiency is a significant predictor of calculation independently. It is not a significant predictor incrementally. Only one of the variables, IPT oral English, is significant independently and incrementally. Villalba et al. (2007) stated that students need to have well-developed cognitive academic language proficiency in order to experience academic success. Underdeveloped language proficiency is strongly correlated with negative academic performance in several key areas, including math (Brenneman et al., 2007). The results of the current study support those findings. Students with more-developed English language proficiency generally have higher levels of math computation performance.

Behavior is a significant predictor of calculation independently. These results are consistent with earlier findings (DiPerna et al., 2007; Fuchs et al., 2005), accounting for more variance than acculturation independently. By contrast, it accounts for less variance than acculturation incrementally. The standard score, social skills-teacher, is a significant variable independently and incrementally. Teacher ratings also account for more variance independently and incrementally. Fuchs et al. also reported similar results, stating there was a substantial correlation between scores from the teacher version of the SSRS and math performance. The social skills ratings from the parent and student are not a significant predictor of calculation either independently or incrementally. Parent ratings are more predictive than student ratings independently. Student ratings are more predictive than parent ratings incrementally.

Acculturation, as a block, is not a significant predictor of calculation either independently or incrementally. Within the acculturation block, primary caregivers' level of education is a significant predictor independently and incrementally. It is also the most predictive variable in the acculturation block. These results are consistent with the findings of Stevenson and Baker (1987) who also reported a positive correlation between the mother's level of education and academic performance. The implication from the current study, consistent with previous research, is that students whose primary caregiver has a higher level of education will have a higher math calculation performance.

Although not significant, the length of students' U.S. residency is the second largest amount of variance independently and incrementally. These results are similar to those reported by Berry (1998) and Ibanez et al. (2004). These previous studies found that the length of U.S. residency is correlated with academic performance. Therefore, it appears that a longer U.S. residency generally results in higher levels of math calculation performance.

It is difficult to establish why this occurs. The calculation of sums, differences, products, and quotients is universal. It cannot be determined from the current study how the acculturation variables influence math calculation performance levels. The data used in the current study only demonstrate a relationship between the two variables. Further, the relationship between the two variables is not statistically significant.

Research Question 2

Which factors, intellectual functioning, language proficiency, reading proficiency, behavior, acculturation, or a combination of factors, most accurately predict the level of math reasoning performance of Latino elementary school students? In combination, the five blocks account for a significant proportion of the variance in applied problems. Collectively, the results show that the blocks examined in the current study account for significant levels of variance in the performance of Latino students on an assessment of math reasoning. This finding means that reading proficiency, behavior, intellectual functioning, language proficiency, and acculturation (as measured by the assessments used in the current study) accurately predict math reasoning performance of Latino elementary school students.

Reading proficiency is the most predictive significant block independently and incrementally. Behavior is the second most predictive significant predictor independently. Intellectual functioning is the third most predictive significant predictor independently. Language proficiency is next to the weakest independently, and acculturation is the weakest independently. Neither language proficiency nor acculturation is a significant predictor independently.

The results support the hypothesis that reading proficiency would be a significant predictor of math reasoning performance. The results do not support the original hypothesis that intellectual functioning would most accurately predict the level of performance on the applied problems subtest. Intellectual functioning is the third most predictive block of significant predictors. Reading proficiency is the most predictive block. Language proficiency is the second most predictive block. Language proficiency is also hypothesized to be a significant predictor of the performance on the applied problems subtest. This hypothesis is partially supported by the results. Language proficiency is a significant predictor of applied problems incrementally but not independently.

Schools can use the assessments employed in the current study to predict the levels of math reasoning performance of Latino elementary school students. Whether the students are being formally evaluated for special education eligibility or whether the data become available for other reasons, schools can use the information to predict math reasoning performance. Those students who have the potential to experience difficulty with math reasoning performance, as determined by the current research results, can be identified as possibly needing additional supports. This information gives schools the opportunity to develop schoolwide and districtwide preventive programs.

Intellectual functioning. Intellectual functioning is a significant predictor of applied problems independently but not incrementally. This finding means that when the relationship between intellectual functioning and applied problems is evaluated, there is a significant correlation. It also means that the amount of additional variance explained by intellectual functioning when the other blocks are held constant is not significant. Intellectual functioning does not add significantly to the predictive strength of the model used in the current study. Within the intellectual functioning block, cube design is a significant variable. It is also the most predictive of the intellectual variables independently and incrementally. This finding is in contrast to the original hypothesis that anticipated FSIQ would most accurately predict math reasoning performance. FSIQ is significant independently but not significant incrementally.

The results of the current study show that there is a clear overlap between the cube design subtest and the FSIQ. In addition, the results show that math reasoning, as measured by the applied problems subtest of the WJ-III, is more accurately predicted by scores from the cube design subtest. This finding implies that the symbolic memory subtest detracts from the predictive capability of the cube design subtest. An equally accurate prediction of math reasoning performance can be obtained by using the FSIQ and the cube design subtest. Although elements of intellectual functioning are predictive of math reasoning performance, the results of the current study do not establish a causal relationship between the two.

Language proficiency. Language proficiency is a significant predictor of applied problems incrementally but not independently. Language proficiency is the second most predictive incrementally and the fourth most predictive independently. The results are consistent with the hypothesis that language proficiency would be an accurate predictor of applied problems. IPT oral English is the most predictive variable in the language proficiency block as well as incrementally. Neither IPT oral English nor IPT oral Spanish is a significant predictor.

The level of English language proficiency is significantly predictive of math reasoning performance when combined with other variables that were included in the model used in the current research. The results of the current study show that as a block language proficiency adds significantly to the predictive capability of the model but does not constitute a significant predictor on its own. The results further show that the level of English language proficiency is more related to higher applied problems scores on the WJ-III than the level of Spanish language proficiency. This finding means that Latino elementary school students with better-developed English language skills have a greater probability of scoring higher on the applied problems subtest. Conversely, Latino students with less well-developed English language proficiency are more likely to score lower on math reasoning assessments. As it applies to Latino elementary school students and math reasoning, the development of English language proficiency is more predictive than Spanish language proficiency. Therefore, it is more valuable to assess English language proficiency than Spanish language proficiency when attempting to predict math reasoning. Although the results of the current study show a correlation between English language proficiency and math reasoning performance, they do not identify causality.

Reading proficiency. The results of the current study are similar to those of previous studies (Jitendra et al., 2007; Mazzocco & Thompson, 2005). These studies concluded that reading proficiency is predictive of math performance. These studies also concluded that subtests from the WJ-R, specifically the letter-word-identification subtest, are correlated with math performance levels (Teisl et al., 2001). The variance accounted for by reading proficiency is significant both independently and incrementally. Of the predictors included in the current study, reading proficiency is the most predictive block relevant to applied problems both independently and incrementally, which is consistent with the original hypothesis that reading proficiency would be a significant predictor of applied problems. These results are also consistent with the findings of Hanich and Jordan (2000). However, the results are inconsistent with the original hypothesis insofar as reading proficiency is more predictive than intellectual functioning. Independently, all four variables within the reading proficiency block (i.e., passage comprehension, letter-word-identification, mean number of words read correctly from CBM English passages one and two, and mean number of words read correctly from CBM Spanish passages one and two) are significant variables. Incrementally, only passage comprehension is significant. Passage comprehension accounts for the largest portion of the variance independently, followed by mean number of words read correctly from CBM English passages one and two, and then letter-word-identification. The smallest proportion of the variance is accounted for by the mean number of words read correctly from CBM Spanish passages one and two.

Based on the results of the current research, elements of reading are significant predictors of math reasoning performance. Students with a greater ability to pronounce words correctly, understand the meanings of written words, and have higher fluency rates are more likely to have higher levels of math reasoning performance; that is, students who are identified as having reading deficiencies have a higher risk for developing math reasoning difficulties. This finding does not mean that the presence of reading deficiencies is the cause of math reasoning difficulties, only that there is a strong correlation between the two. A comprehensive educational evaluation can determine if a student with a reading disability also has a math disability.

Behavior. Behavior is a significant predictor of applied problems independently. Behavior accounts for more of the independent variance than any other single block, with the exception of reading proficiency. Behavior is not a significant predictor incrementally. Behavior accounts for the smallest portion of the variance incrementally. The variable in the behavior block that accounts for the greatest portion of the variance independently and incrementally is the standard score social skills, teacher; it is significant independently and incrementally. The variable accounting for the second greatest portion of the variance independently is the standard score social skills, student; it is not significant. The variable that accounts for the least amount of the variance independently is the standard score social skills, parent; it is also not significant. The variable in the behavior block that accounts for the second greatest amount of incremental variance is the standard score social skills, parent. The standard score social skills, student accounts for the smallest portion of the incremental variance.

By itself, the behavior block is a significant predictor of math reasoning performance. As part of the overall model used in the current research, the incremental variance attributable to behavior is not significant. This finding means that the data obtained from behavior ratings can be useful in predicting math reasoning performance levels under circumstances in which data from the other blocks used in the current research are not available. It also means that additional data obtained by behavior ratings from teachers, parents, and students when included with other blocks used in the current research do not significantly increase the predictive properties of the model. A decision whether to include or exclude behavior ratings in a special education evaluation should be based on other factors not necessarily related to prediction of math reasoning performance.

When behavior ratings are included as part of an evaluation, the data obtained from teachers are more predictive of math reasoning performance than ratings obtained from either the parents or the student. Clearly, the ratings obtained from all three sources (i.e., teachers, parents, and students) are more valuable in the assessment process and constitute a more comprehensive evaluation. If resources or cooperation are limited, it would be more valuable to obtain the ratings from teachers rather than from parents or students.

Acculturation. Acculturation is not a significant predictor of applied problems either independently or incrementally. This finding means that acculturation, as a block, is not a significant predictor of math reasoning. It also means that the additional variance, explained when acculturation was added to the model and all other blocks were held constant, is not significant.

Within the acculturation block, length of students' U.S. residency was significant independently. The implication is that the length of U.S. residency has a greater predictive capability than the other variables within the acculturation block. None of the other variables in the block is a significant predictor incrementally.

Summary. The results of the current study reject the original hypothesis that intellectual functioning would most accurately predict the level of math reasoning performance of Latino elementary school students. The original hypothesis was based on the findings of previous research (Glutting et al., 2006; Taub et al., 2008).

The results of the current study show that reading proficiency is the most accurate block predicting math reasoning performance independently and incrementally. These results are in contrast to the previous findings. In one of the previous studies, the authors concluded that intellectual functioning was highly correlated with math performance and suggested it may be the only variable that needed to be measured (Glutting et al., 2006). The current study found that cube design accounted for more of the independent and incremental variance in math reasoning scores than the FSIQ. Students with a greater ability to assemble colored blocks based on a visual representation generally scored higher on the WJ-III applied problems subtest. This finding refutes the suggestion that overall intellectual functioning is the only cognitive variable that needs to be measured.

The difference between the previous research and the current study is the instruments used to measure intellectual functioning, the participants involved, and the variables included in the analyses. Previous studies typically used verbally loaded instruments to measure intellectual functioning. The current study used a nonverbal instrument and included only Latino students. Previous studies included Latino students as a proportion of the cohort representative of the general population. Prior research generally did not include a direct measurement of language proficiency. In most studies, language was integrated into the intellectual functioning assessment. The current study examined language proficiency as a separate variable. These differences may account for the contrast in the results.

Reading proficiency, behavior, and intellectual functioning are all significant predictors of math reasoning performance independently. These aspects of the current results are consistent with previous findings (Glutting et al., 2006; Jitendra et al., 2007; Mazzocco & Thompson, 2005; Swanson & Beebe-Frankenberger, 2004; Taub et al., 2008). Reading proficiency and language proficiency are significant predictors incrementally. The second strongest predictor independently is behavior. Intellectual functioning is the third strongest predictor of math reasoning independently. The weakest predictor is acculturation, which was not a statistically significant predictor of math reasoning performance.

Among the blocks of significant predictors is reading proficiency, which accounted for the greatest portion of independent and incremental variance in the math reasoning performance levels of Latino elementary school students. The significant relationship between reading proficiency and math reasoning performance revealed in the current study is consistent with the results of previous studies (Fuchs et al., 2005;

Mazzocco & Thompson, 2005; Teisl et al., 2001). This finding may be attributable, in part, to the number of variables within the reading proficiency block. The reading proficiency block consists of four variables. The variables include the passage comprehension and letter-word-identification subtests from the WJ-III. The other variables include the mean number of words read correctly per minute from four CBM reading passages: (a) two written in Spanish and (b) two written in English.

The other blocks have fewer variables. Intellectual functioning has three variables: (a) FSIQ, (b) cube design, and (c) symbolic memory. Behavior also has three variables: (a) standard scores from the SSRS, Teacher Form; (b) SSRS, Parent Form; and (c) SSRS, Student Form. There were also three variables in the acculturation block: (a) length of primary caregivers' U.S. residency, (b) length of students' U.S. residency, and (c) level of primary caregivers' education. The language proficiency block has only two variables: (a) IPT oral Spanish and (b) IPT oral English.

Other factors that may explain the difference in the amount of variance attributable to reading proficiency include the level of correlation between the variables within each block of predictors. For example, two of the variables in the intellectual functioning block are used to derive the third. The FSIQ is derived by using scores from the cube design and symbolic memory subtests. The correlations among the three variables in the intellectual block are greater than the correlations among the variables in the reading proficiency block. Although specific analyses were not used to evaluate the significance of the differences, these differences may offer a partial explanation.

Within the reading proficiency block, passage comprehension accounted for more of the independent and incremental variance than any of the other variables. The variable that accounted for the next largest portion of the variance independently is mean number of words read correctly from CBM English passages one and two. Letter-word-identification accounted for the least amount of variance independently. These results are consistent with previous findings. Swanson and Beebe-Frankenberger (2004) reported that reading skills are necessary to solve math reasoning or word problems. Other previous studies have also shown a significant correlation between assessments that measure phonological processing and sound matching and math performance (Teisl et al., 2001). Behavior accounts for the second largest significant portion of the independent variable independently and incrementally. Behavior also accounts for more of the variance than any of the other variables. The standard score social skills, student variable is the second strongest variable independently, and the standard score social skills, parent variable is the weakest variable independently. Incrementally, the standard score social skills, parent variable is the second strongest variable, and the standard score social skills, student variable is the weakest variable. These results are consistent with the results from previous studies that reported social skills ratings are correlated with math performance (Gresham et al., 1997; Gresham et al., 1987; Teisl et al.). Other previous research with similar results includes the DiPerna et al. (2007) study; they stated that student behavior is predictive of academic performance.

Language proficiency is a significant predictor of math reasoning incrementally. Language proficiency accounts for the second largest amount of incremental variance; it is not a significant predictor independently. Within the language proficiency block, the IPT oral English variable accounts for more of the independent and incremental variance than IPT oral Spanish. The results of the current research are consistent with previous studies that have shown a strong positive correlation between language proficiency and success in an academic setting (Villalba et al., 2007). Other earlier studies have also shown that the IPT oral English is predictive of math performance (Lopez et al., 2007). In addition, this report stated that English proficiency combined with Spanish literacy was strongly correlated with math performance in both elementary school and middle school. The results of the current study are consistent with the previous findings. The results of the current study also extend previous research by showing English language proficiency is more predictive than Spanish language proficiency.

Intellectual functioning is a significant predictor of math reasoning. It is the third most powerful predictor independently in the current study. These results are not completely consistent with previous results. Earlier studies reported that intellectual functioning is significantly related to math performance (Seethaler & Fuchs, 2006). Other researchers have claimed that there are varying levels of correlation between specific measures of intelligence and levels of math achievement (Floyd et al., 2003). The current study reveals a significant relationship between intellectual functioning and math reasoning performance.

Other results of the current study show that within the intellectual block the cube design subtest is more strongly related to math reasoning performance than the symbolic memory subtest. This finding means that the cube design subtest has a stronger correlation than the symbolic memory subtest.

Acculturation is the third strongest predictor incrementally. However, the amount of additional variance accounted for by acculturation is not significant; that is, the amount of additional variance attributable to acculturation does not significantly increase the predictive capability of the model used in the current study and is the weakest predictor independently. The amount of variance in math reasoning performance levels is not significantly correlated to the block comprised of the length of students' U.S. residency, primary caregivers' level of education, or primary caregivers' length of U.S. residency.

Within the acculturation block, the length of students' U.S. residency is the strongest variable independently and incrementally. The primary caregivers' level of education is the second strongest variable independently and incrementally. The weakest variable independently and incrementally is length of the primary caregivers' U.S. residency. These results are not as robust as those from earlier studies. Although similar to previous studies, the results of the current study are not identical.

Limitations

There are a number of limitations in the current study. Although the examination and analyses of the predictor blocks and the variables within those blocks used in the current study were extensive, the variables within those blocks did not include all the variables used in previous studies. Previous research has demonstrated that the language of instruction, acculturation, socioeconomic status, curriculum, and teachers' expertise and years of teaching experience are related to bilingual students' academic performance (Cummins, 1979). The examination of these variables continues to shed light on the most effective educational programming for bilingual students.

Previous research has repeatedly demonstrated that Latino students historically have lesser levels of academic achievement (Cummins, 1979; DeGarmo & Martinez, 2006; Ream, 2005). A significant question raised by previous studies that was not addressed in the current study is the following: Why does this phenomenon exist? Contextual variables are crucial in understanding why a student is not performing sufficiently and planning instruction so as to remedy the student's difficulties (Hosp & Ardoin, 2008). Although this question is central to the academic success of Latino students, the current study did include data or analyses that directly answer questions relevant to why Latino students, as a group, consistently underperform academically compared with many other ethnic groups. Identifying why Latino students generally experience lesser levels of academic performance is an issue paramount to improving educational outcomes.

Another limitation in the current study is a relatively small sample size. The cohort consisted of 87 participants from one urban school in a western state. A larger sample size would have increased statistical power and may have resulted in detecting additional significant relationships among variables. Future research should involve more participants and include multiple schools and districts in order to determine if the relationships among variables are consistent across settings.

The current study did not measure socioeconomic status directly. Socioeconomic status was measured indirectly. All participants in the present study were eligible for free and reduced lunches. Although this is an indicator of socioeconomic status, it is not a direct measure nor does it provide variability among participants. The absence of variability in this domain precluded correlational analyses using socioeconomic status as a variable. Socioeconomic status has been shown to be related to achievement (Taylor & Graham, 2007; Valadez, 2002). Previous research has shown that economically advantaged students generally experience higher levels of achievement compared with their lower socioeconomic status peers. With such a significant proportion of the Latino population living in poverty, much research is needed to investigate variables that mitigate the effects of economic difficulty (Loukas, Suizzo, & Prelow, 2007). The implication in the Loukas et al. study is that socioeconomic status was possibly one of the mitigating factors. Future research should include direct measures of the income level of the participants' household. Specific numerical data would allow for additional analyses that could be beneficial in predicting the math performance levels of Latino elementary school students.

Although the results of the present study show a strong relationship between reading proficiency and both measures of math performance, there are possible alternate explanations for these results. The reading proficiency block included more variables than the other blocks. The inclusion of multiple measures of reading ability, including one achievement subtest designed to measure comprehension, may have resulted in a more precise measurement of the participants' comprehension skill. Intellectual functioning was measured using an abbreviated battery of a nonverbal intelligence test. The abbreviated battery of the UNIT theoretically measures general intelligence or general intellectual functioning, short-term visual memory, complex sequential memory for meaningful material, and visual-spatial reasoning. Although as accurate a measure of general intelligence as most full batteries, some of the elements of intellectual functioning reported in previous research (i.e., processing speed and fluid reasoning) were not separately measured in the present study.

The dependent variables were two individual subtests from one academic achievement battery. These two subtests have been routinely reported to be sufficient measures of math calculation and math reasoning. Additional measures of the same construct would have provided more data to validate the participants' performance. The inclusion of other assessments of math calculation and math reasoning from sources such as CBM could have enhanced the results.

The measures of acculturation were a limitation in the current study. Acculturation was not measured directly. The current study used the participants' and primary caregivers' length of residency in the United States, the participants' and primary caregivers' country of birth, and the participants' and primary caregivers' level of education as acculturation variables. Several instruments measure acculturation directly. The Short Acculturation Scale for Hispanics (Barona & Miller, 1994) and the Multiphasic Assessment of Cultural Constructs–Short Form (Cuellar, Arnold, & Maldonado, 1995) are both empirically supported measures of acculturation. Future research should use instruments similar to these in order to measure acculturation as part of the evaluation of Latino students. Direct measures of acculturation have the potential to identify factors that are significantly related to educational outcomes.

Implications for Future Research

Despite the limitations of the current research, the findings have several implications for future research. The results of the current study have shown that reading proficiency, language proficiency, and behavior have a significant impact on math performance. In addition, elements of acculturation were shown to be related to math performance. Future research should investigate these variables.

Researchers interested in further investigating how to best educate students of Latino ancestry might be wise in allocating their resources at first determining the interrelationship between language acquisition and culture and measuring the intellectual functioning and achievement of bilingual students. There is a marked diversity among the conclusions and hypotheses with regard to the answer to the following central question: Should children who are still learning a second language receive instruction in their primary language or in their second language? Members of the educational community apparently cannot agree on the theoretical or pragmatic elements of bilingual education (MacSwan & Rolstad, 2005). One theory, the facilitation theory, suggests that there is a relationship between learning in one language and the level of academic achievement in a second language. Another hypothesis, the threshold hypothesis, suggests that there is a developmental relationship between the primary language and the second language. Cummins (1979) reported that variables, including language, acculturation, and socioeconomic status, fail to account for the pattern of differential achievement in ethnic minorities. Yet another theory, psychological modularity (Gallistel & Gelman, 2000), a well-established mental process commonly understood by members of the cognitive neuroscientific community, claims that the modular architecture of the human brain is highly influential in language acquisition and that other learning is part of an inherent biological endowment (MacSwan & Rolstad). Such diversity convolutes the basic task of developing efficacious educational programming for Latino students and others whose primary language is not English. Additional research is needed to clarify this issue.

Reading Proficiency

Future research should incorporate measures of reading proficiency when investigating variables that predict math performance of bilingual students. Clearly, reading proficiency has a significant influence on math performance that extends beyond story problems (Jitendra et al., 2007). The results of the current study show that reading is also significantly related to computation.

Reading proficiency is reliant upon the development of multiple skills (Teisl et al., 2001). Future research would be prudent to examine the instructional and curriculum variables involved in the teaching and acquisition of reading skills and relate those findings to math performance. Specific reading skills such as phonological awareness relate to math (Teisl et al.). Additional research is needed to examine how reading programs and interventions impact math performance. Future research needs to examine ways in which reading skills can be related to math performance in a meaningful manner to students whose primary language is not English.

Language Proficiency

Language proficiency is strongly correlated to academic achievement; both math performance and future research should explore that relationship further. Students who have underdeveloped language skills, specifically cognitive academic language proficiency, are likely to struggle when attempting to acquire math skills (Villalba et al., 2007). Language proficiency and reading are closely related (Brenneman et al., 2007). Decoding and oral language skills are essential to academic success in reading and math (Proctor, August, Carlo, & Snow, 2006). Other evidence shows that English language learners, most of whom are Latino, generally score lower than English proficient students and students whose primary language is English (National Center for Education Statistics, 2008b). Future research should investigate the effectiveness of language instruction as it relates to math performance for students whose initial or primary language is not English.

Future research should incorporate the theory of common underlying proficiency (Cummins, 1979) when investigating factors that predict math performance levels of Latino students. This theory suggests that the academic skills for the first language and the second language are interdependent and that they are manifestations of a common underlying proficiency. Results of the current study show that standard scores from the passage comprehension subtest were correlated to both the Spanish and English curriculum-based reading measures. Although the correlation between passage comprehension and CBM, English was greater than the correlation between passage comprehension and CBM, Spanish, both were statistically significant at the $r < .01$ level. These results seem to be supported by the common underlying proficiency theory insofar as the passage comprehension skills measured on the WJ-III are strongly correlated with the participants' ability to read both Spanish and English curriculum passages at approximately the same rate. These results also suggest that further research is necessary to examine the relationship between language variables and academic performance of multilingual students.

Acculturation

Cited previously as a limitation in the current study, the impact of acculturation is a significant factor in achieving success in math. Much of the previous research has investigated the achievement gaps, but few have examined the predictive mechanisms (Loukas et al., 2007). Initially, researchers need to clearly define acculturation and identify variables of acculturation that are measurable. Subsequently, future studies need to investigate which variables of acculturation have the greatest influence on math performance.

Currently, instruments are available that purport to measure acculturation directly. The Short Acculturation Scale for Hispanics (Barona & Miller, 1994) and the Multiphasic Assessment of Cultural Constructs–Short Form (Cuellar et al., 1995) are both empirically supported measures of acculturation, according to the authors' definitions of acculturation. However, based on the literature, it appears there is no universally accepted definition of acculturation or the variables. The issue is not one of reliability but one of validity. Future research should use instruments similar to these as a starting point to measure acculturation as part of the evaluation of Latino students and to make modifications as necessary. Valid, direct measures of acculturation have the potential to identify factors that are significantly related to educational outcomes. Future research should assess acculturation variables by directly using surveys or questionnaires rather than the surrogate measures used in the present study. Valid measures of parental and student acculturation are needed in future research.

The variables discussed by Cummins (1979) and MacSwan and Rolstad (2005) should be incorporated into future research. These studies reported acculturation variables and the method of bilingual education's influence on academic performance. Cummins reported that the language of instruction has a major influence on academic achievement. The results showed that when a team approach, using the students' native language for instruction in the early grades and gradually switching to instruction in English, was used, academic achievement increased. MacSwan and Rolstad reported that there is a difference between learning a language and learning in other domains. These factors should be examined as part of future research.

Future research should investigate the relationship between the theoretical constructs measure by the cube design subtest and measures of math performance. Results of the current study show that scaled scores from the cube design subtest were significantly correlated with standard scores from both the applied problems and calculation subtests.

Although the current study did not specifically measure the underlying constructs of the cube design subtest, the results established cube design as a significant predictor of performance on the calculation and applied problems subtests. The magnitude of the correlation between cube design and the measures of math performance was nearly identical to that of the FSIQ. A comparison between the correlation coefficients of cube design and FSIQ with the dependent variables revealed that the cube design coefficient was slightly greater in both instances. This finding implies the underlying constructs of the cube design subtest (i.e., abstract thinking, analysis, attention to detail, holistic processing, nonsymbolic mediation, nonverbal reasoning, and three-dimensional representation) are as significantly related to math performance or possibly even more so than overall intellectual functioning. This hypothesis was the impetus for the current study. Future research should further investigate this hypothesis to determine the specific relationship between the underlying constructs of the cube design subtest and math performance.

Implications for Practice

Latino students can benefit if school psychologists and others, who are concerned about their educational outcomes, incorporate their findings from the present study in an effort to conduct comprehensive evaluations. The growing number of Latino students in the public education system necessitates an examination of contemporary evaluation practices and the subsequent programming that results. The current study shows the evaluation of Latino students who are experiencing difficulties in math requires the use of a broad range of assessments that may go beyond those currently utilized in a typical educational evaluation. Concerned parties involved in conducting evaluations of Latino students should determine if the assessment of intellectual functioning using verbally oriented tests are appropriate. Based on the results of the current study, other factors that should be evaluated prior to or during an educational assessment are the examinee's reading proficiency, language proficiency in both Spanish and English, and relevant cultural factors.

Latino students who are experiencing difficulties in math may have reading deficiencies, may be experiencing difficulties adjusting to a culture that is diverse from their own, and may have underdeveloped academic-related language skills. Extending that conclusion even further, based on the results of the current study, Latino students experiencing reading difficulties are likely to experience math difficulties as well.

Because factors of reading proficiency have been linked to multiple areas of academic performance, policymakers should be mindful of the implications stemming from the results of the current study. The results of the current study do not demonstrate a causal link between reading skills and math performance, but the significant levels of correlation between reading proficiency and both measures of math performance show that students who are struggling with reading are also likely to be struggling with math.

Policymakers and others involved in public education may elect to review the curriculum and instructional practices relevant to Latino students. Underdeveloped language and reading skills are two of the variables reported in the results of the current study that significantly impact the math performance of Latino students. The approach to resolving these concerns is an important issue that requires serious consideration.

Schools may want to consider expanding their language and reading screening practices in order to identify students who are at risk for math difficulties. As many national initiatives have suggested, early identification and preventive strategies are more effective interventions than curative measures implemented later on. The use of expanded identification and data-driven decisions coupled with empirically validated interventions appear to hold the key to improving educational outcomes for Latino students.

Conclusions

A significant number of Latino students are in the public education system. Historically, these students have lesser levels of academic achievement than nearly all other groups of ethnic minorities. One of the major areas of deficient achievement levels is math. Much of the previous research has investigated various factors of Latino students' reading proficiency, but little has been done to examine the same issues relevant to math. Much more research is needed in this area.

An evaluation of the academic achievement deficiencies of Latino students is more complex than the administration of a series of standardized assessments. Other factors are strongly related to the educational outcomes of Latino students. The tools used to measure academic performance have evolved, but the constructs being measured have remained constant. With the increasing number of Latino students in the public education system, it is paramount that the evaluation process itself continue to evolve to incorporate an assessment of those factors that are unique to this specific population. Additional constructs, including language proficiency, acculturation, and socioeconomic status, are but a few of the factors that influence the achievement levels of Latino students.

The current study evaluated to what extent various factors, including reading proficiency, intellectual functioning, language proficiency, behavior, and acculturation, impact specific measures of math performance in one group of Latino elementary school students. The results of the current study show a strong predictive relationship between reading proficiency and standard scores of Latino elementary school students on the calculation and applied problems subtests of the WJ-III. More precisely, the ability to comprehend written material is the strongest predictor of math reasoning and math computation. Historically, reading and math have been two subject areas educators have perceived as primary to educational success. The results of the current study extend previous research by revealing the influence that one primary academic subject area has on specific elements of another subject.

In addition to the influence reading has on math performance, the current study shows that intellectual functioning, while a significant component of academic success, is not the sole construct that needs to be measured. Within the domain of intellectual functioning, the overall measure is slightly less predictive of math performance than the scaled score of the cube design subtest. It is reasonable to conclude that the underlying constructs of the cube design subtest are strongly related to math reasoning and math computation.

Other factors clearly impact the math performance of Latino students. Acculturation, although not precisely defined within the educational community, was also found to be a strong, but not a significant, predictor. Based on the results of the current study, the amount of time an individual has spent in a country contributes to that person's level of acculturation. This variable is only one variable that contributes to acculturation. Other variables need to be clearly identified and included in the course of an educational evaluation.

The role of the educational community in assisting new students and their families may need to expand in order to improve the educational outcomes of students who do not have the benefits of those born in this country. To the extent feasible, educators should consider increasing efforts to offer additional resources, if available, to improve the opportunities for including Latino families in the educational process. Early interventions and schoolwide preventive measures may mitigate the negative educational outcomes experienced by a significant portion of the Latino student population.

APPENDIX

IDENTIFYING EDUCATIONAL SUCCESS FACTORS FOR LATINO STUDENTS: PARENT/GUARDIAN DEMOGRAPHIC SURVEY

RA: ______________________ Teacher/Grade: ______________________

Interview w/: ____________________ Child ______________________

Date: ___________

Parent / Guardian Information:			Combined
What is your relationship w/ the student? 1= Mom 2= Dad 3=Both 4= Guardian			
Gender: 1= female 2= male			
DOB			
Age			

Ethnicity: (Mexican, Peruvian, American, Goshute, Tongan, Vietnamese, etc)			
Race: 1= Latino, 2= White, 3=Afr Amer, 4= Native Amer 5= Pacific Islander 6= Asian Amer			
# of children			
Child(ren's) age(s)			
Were you born in the U.S? 0= no 1= yes			
If not, where were you born?			
How many years have you been in the U.S?			
Education / Employment:			
What is your highest level of education? 1= 6 or less, 2= 7-8, 3= some HS/no diploma, 4= HS or GED, 5= some college/no diploma, 6= Assoc 7= Bach 8= Masters 9= PhD/EdD/MD			
Where did you attend school? (US, Mexico, both, etc)			

Are you currently working? 0= no 1= yes			
How many jobs do you currently hold?			
What are or is your current employment/work?			
Education / Employment Continued:			**Combined**
Do you hold a professional license here or in another country? If yes, in what? 0= no 1= yes			
What is your combined annual income?			
Do you send any money to family (here or another country)? 0= no 1= yes			
Household:			
How many people live in your home?			
What is your relationship with them? (aunt, cousin, comadre/friend)			

Where is the majority of your extended family? (US city, Mexico, etc)			
Religion:			
Is your family a member of a religious organization? 0= no 1= yes			
Which one? 1= LDS, 2=Catholic, 3= Lutheran, 4= Baptist, 5= Protestant, 6= Other, please specify			
How many hours per week do you devote to your religion? 0= 0, 1=1-3 2= 4-6, 3= 7-9, 4= 10-12			
Do you attend with your child(ren)? 0= no 1= yes			
Language:			
What is your native language? 1= Spanish 2= English			
What is your preferred spoken language? 1= Spanish 2= English			

What language do you speak with your partner in? 1= Spanish 2= English 3= Both			
What language does mom use to speak with child(ren)? 1= Spanish 2= English 3= Both			
What language does dad use to speak with child(ren)? 1= Spanish 2= English 3= Both			
Language Continued:			**Combined**
What language does your child speak to you in? 1= Spanish 2= English 3= Both			
What language do your children (siblings) speak to each other in? 1= Spanish 2= English 3= Both			
What language do other members in the household speak? 1= Spanish 2= English 3= Both			

Other:			
Has anyone in your household been convicted or charged with a criminal offense? 0= no 1= yes			
Student Information:			
Child / Student's Name	[redacted]		
Gender 1= female 2= male			
DOB			
Age			
Grade			
Ethnicity: (Mexican, Peruvian, American, Goshute, Tongan, Vietnamese, etc)			
Race: 1= Latino, 2= White, 3=Afr Amer, 4= Native Amer 5= Pacific Islander 6= Asian Amer			
Were they born in the U.S? 0= no 1= yes			
If not, where were they born?			

How many years have they been in the U.S?	[redacted]
Current school?	[redacted]
Did they attend pre-school (head start)? 0= no 1= yes	[redacted]
Where?	[redacted]
How many schools have they attended?	[redacted]
Where?	[redacted]
What is their native language? 1= Spanish 2= English	[redacted]
What is their preferred spoken language? 1= Spanish 2= English	[redacted]
Student Information Continued:	[redacted]
What language do they speak at home? 1= Spanish 2= English 3= Both	[redacted]
What language do they speak in their classroom? 1= Spanish 2= English 3= Both	[redacted]

What language do they speak with their friends? 1= Spanish 2= English 3= Both	[redacted]

REFERENCES

Achenbach, T., & Edelbrock, C. (1983). *Manual for the Child Behavior Checklist and Revised Child Behavior Profile.* Burlington, VT: University of Vermont, Department of Psychiatry.

Afable-Munsuz, A., & Brindis, C. D. (2006). Acculturation and the sexual and reproductive health of Latino youth in the United States: A literature review. *Perspectives on Sexual and Reproductive Health, 38*(4), 208-219.

AIMSweb progress monitoring and response to intervention system. (2006). Retrieved August 24, 2008, from www.AIMSweb.com

Alfaro, E. C., Umana-Taylor, A. J., & Bamaca, M. Y. (2006). The influence of academic support on Latino adolescents' motivation. *Family Relations, 55,* 279-291.

Almanac of Higher Education. (2004). *Chronicle of higher education.* Washington, DC: Author.

Artiles, A., & Trent, S. (1994). Overrepresentation of minority students in special education: A continuing debate. *Journal of Special Education, 27*(4), 410-437.

Bacchus, A., & O'Connell, M. (1998). *Fertility of American women: Current population reports.* Washington, DC: U.S. Census Bureau.

Ballard, T., & Tighe, M. (1991). *Idea Proficiency Test—IPT.* Brea, CA: Ballard & Tighe Publishing.

Ballard, T., & Tighe, M. (2006a). *Technical manual. IPT I oral grades K-6, English, Forms E and F* (2nd ed.). Brea, CA: Ballard & Tighe Publishing.

Ballard, T., & Tighe, M. (2006b). *IPT 2004. Technical manual. IPT I oral grades K-6, Spanish* (3rd ed.). Brea, CA: Ballard & Tighe Publishing.

Barona, A., & Miller, J. A. (1994). Short Acculturation Scale for Hispanic Youth (SASH-Y). *Hispanic Journal of Behavioral Sciences, 16,* 155–162.

Berg, D. H. (2008). Working memory and arithmetic calculation in children: The contributory roles of processing speed, short-term memory, and reading. *Journal of Experimental Child Psychology, 99*(4), 288-308.

Berry, J. W. (1998). Acculturative stress. In P. B. Organista, K. M. Chun, & G. Marin (Eds.), *Readings in ethnic psychology* (pp. 117-122). New York: Routledge.

Berry, W. D. (1993). *Understanding regression assumptions.* Newbury Park, CA: Sage Publications.

Bloomberg, L., Ganey, A., Alba, V., Quintero, G., & Alcantara, L. A. (2003). Chicano-Latino Youth Leadership Institute: An asset-based program for youth. *American Journal of Health Behavior, 27*(Suppl. 1), S45-S54.

Bol, L., & Berry, R. Q. (2005). Secondary mathematics teachers' perceptions of the achievement gap. *The High School Journal, 88*(4), 32-45.

Bracken, B. A., & McCallum, R. S. (1998). *Universal Nonverbal Intelligence Test: Examiner's manual.* Itasca, IL: Riverside Publishing Company.

Brenneman, M. H., Morris, R. D., & Israelian, M. (2007). Language preference and its relationship with reading skills in English and Spanish. *Psychology in the Schools, 44*(2), 171-181.

Brown, L., Sherbenou, R. J., & Johnsen, S. K. (1990). *Test of Nonverbal Intelligence* (2nd ed.). Austin, TX: Pro-Ed.

Brown, R. W. (1973). *A first language.* Cambridge, MA: Harvard University Press.

Burnam, M. A., Telles, C. A., Karno, M., Hough, R. L., & Escobar, J. (1987). Measurement of acculturation in a community population of Mexican Americans. *Hispanic Journal of Behavioral Sciences, 9*(2), 105-130.

Byrnes, J. P. (2003). Factors predictive of mathematics achievement in White, Black, and Hispanic 12th graders. *Journal of Educational Psychology, 95,* 316-326.

Cabrera, N. J., Shannon, J. D., West, J., & Brooks-Gunn, J. (2006). Parental interaction with Latino infants: Variation by country of origin and English proficiency. *Child Development, 77,* 1190-1207.

Carroll, J. B. (2003). *Human cognitive abilities: A survey of factor-analytic studies.* Cambridge, MA: Cambridge University Press.

Casteneda et al. v. The Regents of the University of California et al., Case No. C99-0525SI (U.S. Dist. Ct., Northern Dist. Ct.). (1999).

Cattell, R. B. (1963). Theory for fluid and crystallized intelligence: A critical experiment. *Journal of Educational Psychology, 54,* 1-22.

Charlebois, P., Brendgen, M., Vitaro, F., Normandeau, S., & Boudreau, J. F. (2004). Examining dosage effects on prevention outcomes: Results from a multimodal longitudinal preventive intervention for young disruptive boys. *Journal of School Psychology, 42,* 201-220.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Hillsdale, NJ: Lawrence Erlbaum.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Cooper, C. R., Cooper, R. G., Azmitia, M., Chavira, G., & Gullatt, Y. (2002). Bridging multiple worlds: How African American and Latino youth in academic outreach programs navigate math pathways to college. *Applied Developmental Science, 6*(2), 73-87.

Cuellar, I., Arnold, B., & Maldonado, R. (1995). Acculturation Rating Scale for Mexican Americans-II: A revision of the original ARSMA scale. *Hispanic Journal of Behavioral Sciences, 17,* 275–304.

Cummins, J. (1979). Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research, 49,* 221–251.

Daniel et al. v. The State of California et al., Case No. BC 214156 (Superior Ct., State of California, Los Angeles Superior Ct.). (1999).

DeGarmo, D. S., & Martinez, C. R., Jr. (2006). A culturally informed model of achievement well-being for Latino youth: The importance of discriminatory experiences and social support. *Family Relations, 55,* 267-278.

DePlanty, J., Coulter-Kern, R., & Duchane, K. M. (2007). Perceptions of parent involvement in academic achievement. *Journal of Educational Research, 100*(6), 361-368.

DeRamirez, R. D., & Shapiro, E. D. (2006). Curriculum-based measurement and the evaluation of reading skills of Spanish-speaking English language learners in bilingual education classrooms. *School Psychology Review, 35,* 356-369.

DiPerna, J. C., Lei, P. W., & Reid, E. E. (2007). Kindergarten predictors of mathematical growth in the primary grades: An investigation using the early childhood longitudinal study—kindergarten cohort. *Journal of Educational Psychology, 99*(2), 369-379.

Dunn, L. M. (1968). Special education for the mildly retarded: Is much of it justifiable? *Exceptional Children, 35,* 5-22.

Eccles, J. S., & Harold, R. D. (1993). Parent-school involvement during the early adolescent years. *Teachers College Record, 94,* 568-587.

(The) Education Trust, Inc. (2006). *EdWatch online 2006 state summary reports. Education watch. Utah. Key education facts and figures. Achievement, attainment and opportunity from elementary school through college.* Washington, DC: Author. Retrieved June 14, 2008, from www.edtrust.org; www2.edtrust.org/edtrust/summaries2006/Utah.pdf

Fives, C. J., & Flanagan, R. (2002). A review of the Universal Nonverbal Intelligence Test (UNIT). *School Psychology International, 23,* 425-448.

Flores, A. (2007). Examining disparities in mathematics education: Achievement gap or opportunity gap? *High School Journal, 91*(1), 29-42.

Floyd, R. G., Evans, J. J., & McGrew, K. S. (2003). Relations between measures of Cattell-Horn-Carroll (CHC) cognitive abilities and mathematics achievement across the school-age years. *Psychology in the Schools, 40,* 155-171.

Fuchs, L. S., Compton, D. L., Fuchs, D., Paulson, K., Bryant, J. D., & Hamlett, C. L. (2005). The prediction, identification, and cognitive determinants of math difficulty. *Journal of Educational Psychology, 97,* 493-513.

Fuchs, L. S., Fuchs, D., Hosp, M. K., & Jenkins, J. (2001). Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. *Scientific Studies of Reading, 5,* 239-256.

Gallistel, C. R., & Gelman, R. (2000). Nonverbal numerical cognition: From reals to integers. *Trends in Cognitive Sciences, 4,* 59-65.

Gandara, P. (2005). Strengthening the academic pipeline leading to careers in math, science, and technology for Latino students. *Journal of Hispanic Higher Education, 5,* 222-237.

Gibson, M. A., & Bejinez, L. F. (2002). Dropout prevention: How migrant education supports Mexican youth. *Journal of Latinos and Education, 1*(3), 155-175.

Glutting, J. J., Watkins, M. W., Konold, T. R., & McDermott, P. A. (2006). Distinctions without a difference: The utility of observed versus latent factors from the WISC-IV in estimating reading and math achievement. *Journal of Special Education, 40*(2), 103-114.

Good, R. H., & Kaminski, R. A. (Eds.). (2002). *Dynamic indicators of basic early literacy skills* (6th ed.). Eugene, OR: Institute for the Development of Educational Achievement.

Gresham, F. M., & Elliott, S. N. (1989). Social skills assessment technology for LD students. *Learning Disability Quarterly, 12*(2), 141-152.

Gresham, F. M., & Elliott, S. N. (1990). *Social Skills Rating System.* Circle Pines, MN: American Guidance Services.

Gresham, F. M., MacMillan, D. L., & Bocian, K. M. (1997). Teachers as "tests": Differential validity of teacher judgments in identifying students at risk for learning difficulties. *School Psychology Review, 26,* 47-60.

Gresham, F. M., Reschley, D. J., & Carey, M. P. (1987). Teachers as "tests": Classification accuracy and concurrent validation in the identification of learning disabled children. *School Psychology Review, 16,* 543-553.

Guiberson, M. (2009). Hispanic representation in special education: Patterns and implications. *Preventing School Failure, 53*(3), 167-176.

Hanich, L. B., & Jordan, N. C. (2000). Achievement-related beliefs of third-grade children with mathematics and reading difficulties. *Journal of Educational Research, 97*(5), 227-233.

Hawley, S. R., Chavez, D. V., & St. Romain, T. (2007). Developing a bicultural model for academic achievement: A look at acculturative stress, coping, and self-perception. *Hispanic Journal of Behavioral Sciences, 29,* 283-299.

Hess, R. S., & D'Amato, R. C. (1996). High school completion among Mexican American children: Individual and family background variables. *School Psychology Quarterly, 11*(4), 353-368.

Hooper, V. S., & Bell, S. M. (2006). Concurrent validity of the Universal Nonverbal Intelligence Test and the Leiter International Performance Scale-Revised. *Psychology in the Schools, 43*(2), 143-148.

Horn, J. L., & Cattell, R. B. (1966). Refinement and test of the theory of fluid and crystallized generalized intelligences. *Journal of Educational Psychology, 57,* 253-270.

Hosp, J. L., & Ardoin, S. (2008). Assessment for instructional planning. *Assessment for Effective Intervention, 33,* 69-77.

Hosp, J. L., & Reschly, D. J. (2004). Disproportionate representation of minority students in special education: Academic, demographic, and economic predictors. *Council for Exceptional Children, 70*(2), 185-199.

Hosp, M. K., Hosp, J. L., & Howell, K. H. (2007). *The ABCs of CBM: A practical guide to curriculum-based measurement.* New York: Guilford Press.

Ibanez, G. E., Kupermine, G. P., Jurkovic, G., & Perilla, J. (2004). Cultural attributes and adaptations linked to achievement and motivation among Latino adolescents. *Journal of Youth and Adolescence, 33*(6), 559-568.

Jacobson, C. J., Flanagan, K. D., McPhee, C., & Park, J. (2007). *Preschool: First findings from the preschool follow-up of the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B)* (NCES 2008-025). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics.

Jitendra, A. K., Griffin, C. C., Haria, P., Leh, J., Adams, A., & Kaduvettor, A. (2007). A comparison of single and multiple strategy instruction on third-grade students' mathematical problem solving. *Journal of Educational Psychology, 99*(1), 112-127.

Jordan, N. C., Kaplan, D., Locuniak, M. N., & Ramineni, C. (2007). Predicting first-grade math achievement from developmental number sense trajectories. *Learning Disabilities Research & Practice, 22*(1), 36-46.

Kane, M. A., & Henderson, F. (2006). Hartnell College's academic learning center: Recommitting to underrepresented student access and success. *Community College Journal of Research & Practice, 30*(2), 133-134.

Kaufman, A. S., & Kaufman, N. L. (1985). *Kaufman Test of Educational Achievement.* Circle Pines, MN: American Guidance Service.

Kaufman, A. S., & Kaufman, N. L. (1990). *Kaufman Brief Intelligence Test manual.* Circle Pines, MN: American Guidance Service.

Klopfenstein, K. (2004). Advance placements: Do minorities have equal opportunity? *Economics of Education Review, 23*(2), 115-131.

Kupermine, G. P., Darnell, A. J., & Alvarez-Jimenez, A. (2008). Parent involvement in the academic adjustment of Latino middle and high school youth: Teacher expectations and school belonging as mediators. *Journal of Adolescence, 31,* 469-483.

Kyttala, M., & Lehto, J. E. (2008). Some factors underlying mathematical performance: The role of visuospatial working memory and nonverbal intelligence. *European Journal of Psychology of Education, 33*(1), 77-94.

Laird, J., Lew, S., DeBell, M., & Chapman, C. (2006). *Dropout rates in the United States: 2002 and 2003* (NCES 2006-062). Washington, DC: National Cènter for Education Statistics, U.S. Department of Education.

La Roche, M. J., & Shriberg, D. (2004). High stakes exams and Latino students: Toward a culturally sensitive education for Latino children in the United States. *Journal of Educational and Psychological Consultation, 15*(2), 205-223.

Lee, S. M., & Edmonston, B. (2006). Hispanic intermarriage, identification, and U.S. Latino population change. *Social Science Quarterly, 87*(5), 1263-1279.

Lopez, E. M., Gallimore, R., Garnier, H., & Reese, L. (2007). Preschool antecedents of mathematics achievement of Latinos: The influence of family resources, early literacy experiences, and preschool attendance. *Hispanic Journal of Behavioral Sciences, 29*(4), 456-471.

Loukas, A., Suizzo, A., & Prelow, H. M. (2007). Examining the resource and protective factors in the adjustment of Latino youth in low income families: What role does maternal acculturation play? *Journal of Youth & Adolescence, 36,* 489-501.

Mace-Matluck, R., Alexander-Kasparik, R., & Queen, P. (1998). *Through the golden door: Educational approaches for immigrant adolescents with limited schooling*. McHenry, IL: Delta Systems and Center for Applied Linguistics.

MacSwan, J., & Rolstad, K. (2005). Modularity and the facilitation effect: Psychological mechanisms of transfer in bilingual students. *Hispanic Journal of Behavioral Sciences, 27,* 224-243.

Maldonado-Molina, M. M., Reyes, N. A., & Espinosa-Hernandez, G. (2006). Prevention research and Latino families: Resources for researchers and practitioners. *Family Relations, 55,* 403–414.

Marotta, S. A., & Garcia, J. G. (2003). Latinos in the United States in 2000. *Hispanic Journal of Behavioral Sciences, 25*(1), 13-34.

Martinez-Aleman, A. M. (2006). Latino demographics, democratic individuality, and educational accountability: A pragmatist's view. *Educational Research, 35,* 25-31.

Mazzocco, M. M. M., & Thompson, R. E. (2005). Kindergarten predictors of math disability. *Learning Disability Research and Practice, 20*(3), 142-155.

McClave, J. T., & Sincich, T. (2000). *Statistics* (8th ed.). Upper Saddle River, NJ: Prentice Hall.

McGrew, K. S., & Woodcock, R. W. (2001). *Technical manual. Woodcock-Johnson III.* Itasca, IL: Riverside Publishing Company.

McKown, C., & Weinstein, R. S. (2008). Teacher expectations, classroom context, and the achievement gap. *Journal of School Psychology, 46*(3), 235-267.

Naglieri, J. A. (1985). *Matrix Analogies Test-Expanded Form: Examiner's manual.* San Antonio, TX: The Psychological Corporation.

Naglieri, J. A., & Rojhan, J. (2004). Construct validity of the PASS theory and CAS: Correlations with achievement. *Journal of Educational Psychology, 96*(1), 174-181.

National Center for Education Statistics. (2001). *The 1998 high school transcript study. Tabulation: Comparative data on credits earned and demographics for 1998, 1994, 1990, 1987, and 1982 high school graduates* (NCES 2001-498). Washington, DC: Author.

National Center for Education Statistics. (2007a). *Dropout rates in the United States, 2005: A compendium report* (NCES 2007-059). Washington, DC: Author.

National Center for Education Statistics. (2007b). *Mapping 2005 state proficiency standards onto the NAEP scales* (NCES 2007-482). Washington, DC: Author.

National Center for Education Statistics. (2007c). *The nation's report card 2007: National assessment of educational progress at grades 4 and 8* (NCES 2007-494). Washington, DC: Author. Retrieved August 24, 2008, from http://nces.ed.gov/nationsreportcard/pdf/main2007/2007494.pdf

National Center for Education Statistics. (2008a). *Comparison between NAEP and state mathematics assessment results: 2003* (Vol. 2; NCES 2008-475). Washington, DC: Author.

National Center for Education Statistics. (2008b). *Mathematics achievement of language minority students during the elementary years* (NCES 2009-036). Washington, DC: Author.

National Research Council. (2002). *Minority students in special and gifted education.* Washington, DC: National Academy Press.

Ochoa, J. (1996). An investigation of school psychologists' assessment practices of language proficiency with bilingual and limited-English-proficient students. *Diagnostique, 21*(4), 17-36.

Ogbu, J. (1991). Minority coping responses and school experiences. *Journal of Psychohistory, 18,* 433-455.

Osterreich, H. A., & Knight, M. G. (2008). Facilitating transitions to college for students with disabilities from culturally and linguistically diverse backgrounds. *Intervention in School and Clinic, 43*(5), 300-304.

Oswald, D. P., Coutinho, M. J., & Best, A. M. (2002). Community and school predictors of overrepresentation of minority children in special education. In D. J. Losen & G. Orfield (Eds.), *Racial inequity in special education* (pp. 1-14). Boston: Harvard Education Press.

Pagani, L., Tremblay, R. E., Vitaro, F., Boulerice, B., & McDuff, P. (2001). Effects of grade retention on academic performance and behavioral development. *Development and Psychopathology, 18,* 431-452.

Perez, B., Skiba, R. J., & Chung, C. (2008). *Latino students' disproportionality in special education* (Education Policy Brief). Bloomington, IN: Indiana University, Indiana Center for Evaluation and Educational Policy.

Perez-Johnson, I., & Maynard, R. (2007). The case for early, targeted interventions to prevent academic failure. *Peabody Journal of Education, 82*(4), 587–616.

Piers, E. V. (1984). *Piers-Harris Children's Self-Concept Scale.* Los Angeles: Western Psychological Services.

Pray, L. (2005). How well do commonly used language instruments measure English oral-language proficiency? *Bilingual Research Journal, 29*(2), 387-409.

Prelow, H. M., & Loukas, A. (2003). The role of resource, protective, and risk factors on achievement-related outcomes of economically disadvantaged Latino youth. *Journal of Community Psychology, 31*(5), 513-529.

Proctor, B. E., Floyd, R. G., & Shaver, R. B. (2005). Cattell-Horn broad cognitive abilities profiles of low math achievers. *Psychology in the Schools, 42*(1), 1-12.

Proctor, C. P., August, D., Carlo, M. S., & Snow, C. (2006). The intriguing role of Spanish language vocabulary knowledge in predicting English reading comprehension. *Journal of Educational Psychology, 98*(1), 159-169.

(The) Psychological Corporation. (1999). *Wechsler Abbreviated Scale of Intelligence.* San Antonio, TX: Author.

Raven, J. C. (1960). *Guide to using Standard Progressive Matrices.* London: H. K. Lewis.

Ream, R. K. (2005). Toward understanding how social capital mediates the impact of mobility on Mexican American achievement. *Social Forces, 84*(1), 201-224.

Reardon, S. F., & Galindo, C. (2007). Patterns of Hispanic students' math skill proficiency in the early elementary grades. *Journal of Latinos and Education, 6*(3), 229–251.

Riegle-Crumb, C. (2006). The path through math: Course sequence and academic performance at the intersection of race-ethnicity and gender. *American Journal of Education, 113*(1), 101-123.

Rooney, P., Hussar, W., DePlanty, J., Choy, S., Hampden-Thomas, G., Provasnik, S. et al. (2006). *The condition of education, 2006.* Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Rueda, R., & Windmueller, M. P. (2006). English language learners, LD, and overrepresentation: A multiple-level analysis. *Journal of Learning Disabilities, 39*(2), 99-107.

Schoenfeld, A. (2002). Making mathematics work for all children: Issues of standards, testing, and equity. *Educational Researcher, 31*(1), 13-25.

Sciarra, D. T., & Whitson, M. L. (2007). Predictive factors in postsecondary educational attainment among Latinos. *Professional School Counseling, 10*(3), 307-316.

Seethaler, P. M., & Fuchs, L. S. (2006). The cognitive correlates of computational estimation skill among third-grade students. *Learning Disabilities Research & Practice, 21*(4), 233-243.

Siegel, R. G., Galassi, J. P., & Ware, W. B. (1985). A comparison of two models for predicting mathematics performance: Social learning versus math aptitude-anxiety. *Journal of Counseling Psychology, 32*(4), 531-538.

Skiba, R., Simmons, A., Ritter, S., Kohler, K., Henderson, M., & Wu, T. (2006). The context of minority disproportionality: Practitioner perspectives on special education referral. *Teachers College Record, 108*(7), 1424–1459.

Smith-Adcock, S., Daniels, M. H., Lee, S. M., Villalba, J. A., & Indelicato, N. A. (2006). Culturally responsive school counseling for Hispanic/Latino students and families: The need for bilingual school counselors. *Professional School Counseling, 10*(1), 92-101.

Solórzano, D. G., & Ornelas, A. (2002). A critical race analysis of advanced placement classes: A case of educational inequality. *Journal of Latinos and Education, 1*(4), 215-229.

State Office of Ethnic Affairs (2004). *The Hispanic/Latino population in Utah.* Retrieved August 20, 2008, from http://ethnicoffice.utah.gov/public_policy_and_research/documents/oea.his.lat.0505.pdf

Stephens, T. (1978). *Social skills in the classroom.* Columbus, OH: Cedars Press.

Stevens, T., Olivarez, A., Jr., Lan, W. Y., & Tallent-Runnels, M. K. (2004). Role of mathematics self-efficacy and motivation in mathematics performance across ethnicity. *Journal of Educational Research, 97*(4), 208-222.

Stevenson, D. L., & Baker, D. P. (1987). The family-school relation and the child's school performance. *Child Development, 58,* 1348-1357.

Suh, S., Suh, J., & Houston, I. (2007). Predictors of categorical at-risk high school dropouts. *Journal of Counseling and Development, 85,* 196-203.

Suizzo, M. A., & Stapleton, L. M. (2007). Home-based parental involvement in young children's education: Examining the effects of maternal education across U.S. ethnic groups. *Educational Psychology, 27*(4), 533-556.

Swanson, H. L., & Beebe-Frankenberger, M. (2004). The relationship between working memory and mathematical problem solving in children at risk and not at risk for serious math difficulties. *Journal of Educational Psychology, 96*(3), 417-491.

Tapia, J. (2004). Latino households and schooling: Economic and sociocultural factors affecting students' learning and academic performance. *International Journal of Qualitative Studies in Education, 17*(3), 415-436.

Taub, G. E., Keith, T. Z., Floyd, R. G., & McGrew, K. S. (2008). Effects of general and broad cognitive abilities on mathematics achievement. *School Psychology Quarterly, 23*(2), 187-198.

Taylor, A. Z., & Graham, S. (2007). An examination of the relationship between achievement values and perceptions of barriers among low-SES African American and Latino students. *Journal of Educational Psychology, 99*(1), 52-64.

Taylor, G., & Nixon, L. (1996). *Teachers' and parents' perceptions toward the effects of social skills training on reading and mathematics achievement of young African Americans* (ED 403 221). Unpublished manuscript. Retrieved June 25, 2008, from ERIC database.

Teisl, J. T., Mazzocco, M. M., & Myers, G. F. (2001). The utility of teacher ratings for predicting low academic achievement in first grade. *Journal of Learning Disabilities, 34*(3), 286-293.

U.S. Census Bureau. (1990). *1990 census of population: General population characteristics* (U.S. Census Bureau Publication No. CP-1-1). Washington, DC: U.S. Government Printing Office.

U.S. Census Bureau. (2000a). *Census 2000 summary file 1.* Washington, DC: U.S Government Printing Office.

U.S. Census Bureau. (2000b). *The Hispanic population: Census 2000 brief* (U.S. Census Bureau Publication No. C2KB/01-03). Washington, DC: U.S Government Printing Office.

U.S. Census Bureau. (2003, August). *School enrollment: 2000* (U.S. Census Bureau Publication No. C2KBR-26). Washington, DC: Author.

U.S. Department of Education, National Center for Education Statistics. (2003). *Status and trends in the education of Hispanics* (NCES 2003-008). Washington, DC: Author.

Valadez, J. R. (2002). The influence of social capital on mathematics course selection by Latino high school students. *Hispanic Journal of Behavioral Sciences, 24*(3), 319-339.

Villalba, J. A., Akos, P., Keeter, K., & Ames, A. (2007). Promoting Latino student achievement and development through the ASCA national model [R]. *Professional School Counseling, 10*(5), 464-474.

Wechsler, D. (1991). *Wechsler Intelligence Scale for Children* (3rd ed.). San Antonio, TX: The Psychological Corporation.

Wechsler, D. (1992). *Wechsler Individual Achievement Test*. San Antonio, TX: The Psychological Corporation.

Wechsler, D. (2002). *Wechsler Individual Achievement Test* (2nd ed.). San Antonio, TX: The Psychological Corporation.

Wechsler, D. (2003). *Wechsler Intelligence Scale for Children* (4th ed.). San Antonio, TX: The Psychological Corporation.

Williams, B. (Ed.). (2003). *Closing the achievement gap*. Alexandria, VA: Association for Supervision and Curriculum Development.

Wilson, V. L., & Hughes, J. N. (2006). Retention of Hispanic/Latino students in first grade: Child, parent, teacher, school, and peer predictors. *Journal of School Psychology, 44*(1), 31-49.

Winzer, M., & Mazurek, K. (1998). *Special education in multicultural contexts*. Retrieved July 22, 2008, from ERIC database.

Woodcock, R. W. (1997). *Woodcock Diagnostic Reading Battery*. Itasca, IL: Riverside Publishing Company.

Woodcock, R. W., & Johnson, M. (1989). *Woodcock-Johnson, Revised: Tests of Achievement*. Itasca, IL: Riverside Publishing Company.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock-Johnson III: Tests of Achievement*. Itasca, IL: Riverside Publishing Company.

Woodcock, R. W., Munoz-Sandoval, A. F., McGrew, K. S., & Mather, N. (2003). *Bateria*. Itasca, IL: Riverside Publishing Company.

Yowell, C. (2002). Dreams of the future: The pursuit of education and career possible selves among ninth grade Latino students. *Applied Developmental Science, 2,* 62-72.

Zaman, A. (2006). Parental roles in the acquisition of primary skills: An exploratory view on the low-income Hispanic American families with 3- and 4-year-old children. *Education, 127*(1), 73-82.